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Amerila (Lepidoptera: Erebidae: Arctiinae) of Cameroon with morphological remarks on male and female genitalia

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Abstract

Amerila is one of the most studied Afrotropical genera of Arctiinae. However, based on a regionally constrained sample of specimens from Mount Cameroon, we show how superficial our knowledge on these tiger moths is. Among six collected *Amerila* species, *A. femina*'s female is described here for the first time, and *A. mulleri* and *A. roseomarginata* had never been recorded before in the country. Moreover, novel biological data are presented, including individual species' elevational ranges. Finally, female reproductive organs of the genus are illustrated here for the first time. The value of such regional studies is highlighted, with some remarks on necessary requirements of such small-scaled field sampling.

Key words: Africa, Amerilini, Mount Cameroon, new species record, tiger moths, taxonomy

INTRODUCTION

Amerila Walker, 1855 is a diverse genus of tiger moths (Erebidae: Arctiinae: Amerilini) with approximately 60 described species distributed in the Old World tropics (Häuser 1993). More than half of them inhabit Sub-Saharan Africa, including its offshore islands such as Aldabra in the Seychelles archipelago (Fryer 1912), Mauritius (Cramer 1781), Madagascar (de Toulgoët 1978; Häuser & Boppré 1997), Comoros (de Toulgoët 1978), Zanzibar (Bartel 1903; Holland 1896) in the Indian Ocean, and Principe (Aurivillius 1910; Berio 1935) and Bioko (Aurivillius 1925) in the Gulf of Guinea in the Atlantic Ocean. The genus was traditionally included in the tribe Arctiini based on its superficial similarity to some other tropical genera (e.g., *Rhodogastria*, *Caryatis*). However, modern phylogenetical studies based on genetic data provided the unexpected evidence that *Amerila* rather constitutes a sister group to the Syntomini+Arctiini clade formally proposed as the tribe Amerilini by Dubatolov (2010) and confirmed by later phylogenetic studies (Zahiri *et al*. 2012; Zaspel *et al*. 2014; Zenker *et al*. 2017).

Although the *Amerila* genus is among the best-known Afrotropical tiger moths, interest of both collectors and scientists is still limited, despite the relatively large size and attractive coloration of the genus members. The milestone regarding the knowledge on the taxonomy and distribution of the African species is the monograph by Häuser & Boppré (1997), preceded by a species list included in the summary of Afrotropical tiger-moths (Goodger & Watson 1995) and the world catalogue of the species-group names (Häuser 1993). The only later contribution to the alpha taxonomy of the genus is Kühne (2008), containing photographs of male genitalia of the morphologically similar species *A. luteibarba* (Hampson, 1901) and *A. affinis* (Rothschild, 1910), depicting the specific characteristics of both taxa deeper than in Häuser & Boppré (1997). A few remaining recent publications mainly focused on presenting new distributional records for a few species only (Dubatolov 2009; Hacker 2016; Baron *et al.* 2017).

The reproductive organs of both *Amerila* sexes are rather insufficiently studied. The descriptions of most of the

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taxa in Häuser & Boppré (1997) contained only drawings of male genitalia with separately illustrated morphological details of vesica, uncus and valva. In contrast, no female genitalia have ever been illustrated. Similarly, Kühne (2008) illustrated male genitalia of *A. luteibarba* and *A. affinis* only, whereas the catalogue of African tiger moths (Goodger & Watson 1995) illustrates only male genitalia of an Asian species, *A. astreus* (Drury, 1773). In summary, to our knowledge, no comprehensive description nor illustration of any African *Amerila* female reproductive organs has ever been published.

Cameroon lies on the border between the Guinean, Congolian and Sudanian biogeographic regions (Linder *et al.* 2012). Hence it hosts fauna elements of all three regions, together with numerous endemic species of Lepidoptera (Heppner 1991; Larsen 2005; Joannou & Krüger 2009; Yakovlev 2015; Sáfián & Tropek 2016). Moreover, the country offers a large spectrum of biotopes, ranging from tropical lowland rainforests in the south to dry savannas and Sahel in the north, additionally enriched by the only substantial areas of high mountains in the region. As a result, Cameroon is considered one of the most species-rich areas in Africa for a wide range of taxa, including moths (Heppner 1991; Ballesteros-Mejia *et al*. 2013). However, despite its high biodiversity and biogeographic importance, Cameroonian moth fauna has still been insufficiently studied. Most of our recent knowledge on the local moth diversity is based on wider catalogues and on biogeographical studies of a few emblematic groups such as Saturniids and Sphingids (e.g. Darge 1995, 2003; Kitching & Cadiou 2000; Ballesteros-Mejia *et al.* 2013), or a study of diversity patterns of larger lepidopteran taxa (Maicher *et al.* 2018). Most recent publications on other groups are restricted to rather scarce faunistic records or species descriptions (e.g. Tropek *et al*. 2015; Maicher *et al*. 2016; Ustjuzhanin *et al.* 2018). Even such a large and relatively colorful group of tiger moths lacks any comprehensive inventory. The only species list of Cameroonian Arctiinae can be compiled from the African catalogue (Goodger & Watson 1995), and the monograph by Häuser & Boppré (1997). No detailed work on any tiger moth groups, including *Amerila*, exists from the country.

In this paper, we summarize the available data on all species of *Amerila* ever recorded from Cameroon, supplemented by our recent extensive collections from Mount Cameroon, bringing new country records of two additional species. We also use the recently collected material to briefly discuss the morphological variation of a few selected species. Additionally, for the first time we comprehensively describe and illustrate the morphology of female reproductive organs of a few representatives of the genus, together with a description of the so far unknown female of *A. femina*. Finally, we comment on the misleading interpretation of *A. syntomina* as published in the monograph by Häuser & Boppré (1997) based on examination of the type specimen and other newly collected material.

MATERIALS AND METHODS

We summarized all published records of the genus from Cameroon, using mainly Häuser & Boppré (1997) and the AfroMoths web page (De Prins & De Prins 2018). All original references cited in the AfroMoths have been checked in order to ensure correct information.

Most of the newly collected material discussed in this paper originates from the southwestern slopes of Mount Cameroon, South-West Province, where R. Tropek, V. Maicher, and Sz. Sáfián, together with Štěpán Janeček, Pavel Potocký, Sylvain Delabye, Jan Mertens and other colleagues, have been studying changes of Lepidoptera communities along the altitudinal gradient since 2014. Here, we present specimens collected during seven field expeditions (November/December 2014, April/May 2015, January/February and November/December 2016, January/February, March and October 2017) in eight sampling sites:

Bamboo Camp: N 4.0879°, E 9.0505°; 350 m a.s.l., lowland rainforest with historical disturbances by selective logging;

Drink Gari camp: N 4.1014°, E 9.0610°; 650 m a.s.l., lowland rainforest with a presumably closed canopy;

Ekonjo: N 4.0921°, E 9.1156°; 1800 m a.s.l., upland rainforest with a presumably closed canopy

Crater Lake: N 4.1443° E 9.0717°; 1450 m a.s.l., upland rainforest locally disturbed by elephants;

Elephant Camp: N 4.1453°, E 9.0870°; 1850 m a.s.l., montane forest locally disturbed by elephants;

Mapanja: N 4.1191°, E 9.1284°; 1800 m a.s.l., montane forest of a presumably closed canopy;

Mann's Spring camp: N 4.1428°, E 9.1226°; 2200 m a.s.l., montane forest close to the natural timberline;

PlanteCam camp (also misspelled as Planty camp): N 4.1175°, E 9.0709°; 1100 m a.s.l., upland forest locally disturbed by elephants.

During these expeditions, we sampled also in another site (Bimbia-Bonadikombo Community Forest, N 3.9818°, E 9.2625°, 30 m a.s.l.) following the same protocol, but no *Amerila* specimen was recorded there. Our sampling per site implied several full nights of an active catching of all Arctiinae attracted by light (an energy-saving bulb: 4100 K, 5300 lm, 105 W, 5U), supplemented with an intensive bait-trapping by fermented mashed bananas (for more details on the sampling protocol, see Maicher *et al.* 2018) around each camp. A single specimen collected in the Dom forest, North-West Province, Cameroon (1850–2100 m a.s.l., N 6.3570°, E 10.6088°, mosaic of montane forests and open habitats), by the last author was added. Voucher specimens are deposited in the Nature Education Centre of Jagiellonian University, Krakow, Poland.

The terminology for the genitalia morphology description is based on Kôda (1987). Wing and body measurements (in millimeters) were taken using a digital caliper. The forewing length was measured along the costa from the wing base to the apex of the terminal fringe scales. Photographs of specimens were taken using a Canon EOS 40D digital SLR camera. Genitalia photographs were taken with a Nikon SMZ binocular microscope. For each species, *weighted mean elevation* (i.e. the average of elevations for all individuals of a given species, Menéndez *et al*. 2014) was calculated, and together with the highest and lowest record also visualized in Fig. 1.

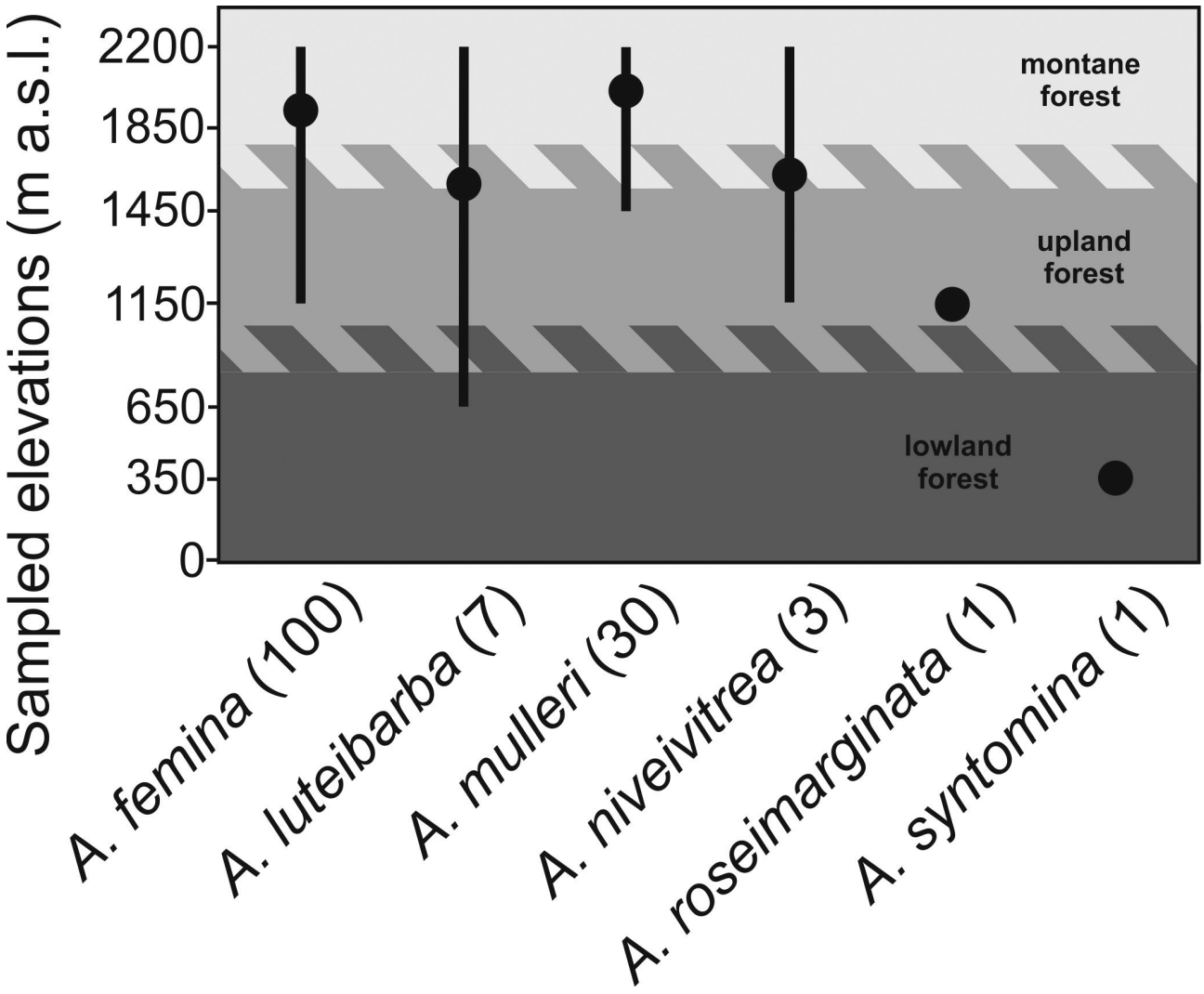


FIGURE 1. Elevational distribution of *Amerila* species on Mount Cameroon. The three elevational zones, with their transitions, are visualized by different colors. The weighted mean elevation of individual species (black dot), together with their lowest and highest records, are visualized. After species names, numbers of collected specimens are stated.

RESULTS

During the present surveys on Mount Cameroon, 142 specimens of six *Amerila* species were collected. All six spe-

cies were attracted by light. *Amerila femina*, *A. luteibarba,* and *A. niveivitrea* were also captured by bait traps. The sampled material includes a so far unknown female of *A. femina*, 30 specimens of *A. mulleri,* and a specimen of *A. roseomarginata* never recorded in Cameroon, as well as a male of *A. syntomina* which had already been reported from the country but without any locality specification. Together with this material, 13 *Amerila* species are currently known from Cameroon.

Checklist of Cameroonian *Amerila*

Species with further remarks are marked with '*', new country records with '**'.
Amerila brunnea (Hampson, 1901)
**Amerila femina* (Berio, 1935)
Amerila fennia (Druce, 1887)
Amerila leucoptera (Hampson, 1901)
* *Amerila luteibarba* (Hampson, 1901)
** *Amerila mulleri* (Häuser and Boppré, 1997)
Amerila nigroapicalis (Aurivillius, 1899)
* *Amerila niveivitrea* (Bartel, 1903)
Amerila puella rothi (Rothschild, 1910)
** *Amerila roseomarginata* (Rothschild, 1910)
* *Amerila syntomina* (Butler, 1787)
Amerila vidua (Cramer, 1780)
Amerila vitrea Plötz, 1880

Specimen data, descriptions, and annotations on selected species

Amerila femina (Berio, 1935) (Figs 2–6, 16–17, 25)

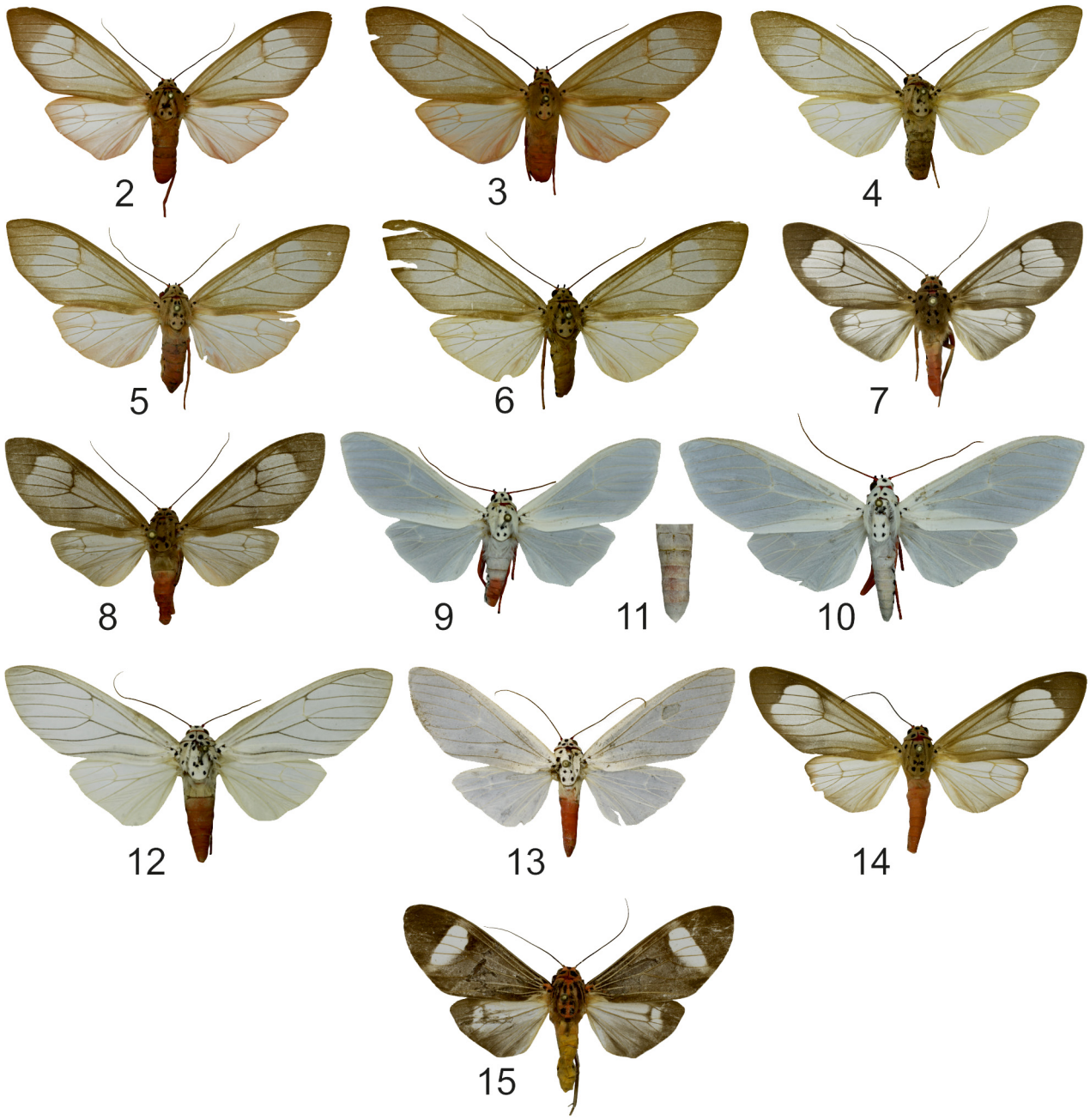
Material (98 specimens). 1♂ Mount Cameroon (SW slope), 18.xi.2014, Elephant camp (1850 m a.s.l.), N 4.1453°, E 9.0870°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek; 1♂ as above but 19.xi.2014; 2♂♂ as above but 24.xi.2014; 1♂ as above but 25.xi.2014; 1♂ as above but 20.iv.2017, lgt. V. Maicher, P. Potocký, S. Delabye; 8♂2♀♀ as above but 25.iv.2017; 1♀ as above but Ekonjo sector, 21.x.2017, Ekonjo camp (1150 m a.s.l.), N 4°0921, E 9°1156, lgt. V. Maicher, S. Delabye; 1♂ as above but 6.xi.2016, Mann's Spring (2200 m a.s.l.), N 4.1428°, E 9.1226°, lgt. V. Maicher, Š. Janeček, R. Tropek; 2♂♂ as above but 7.xi.2016; 1♂ as above but 9.xi.2016; 1♂ as above but 28.i.2017, lgt. P. Potocký, R. Tropek, J. Mertens, Š. Janeček; 2♂♂1♀ as above but 17.iv.2017, lgt. V. Maicher, P. Potocký, S. Delabye; 6♂♂6♀♀ as above but 18.iv.2017; 1♂10♀♀ as above but 19.iv.2017; 3♂♂1♀ as above but 20.iv.2017; 5♂♂ as above but 21.iv.2017; 4♂♂ as above but 19.iv.2017, lgt. V. Maicher, P. Potocký, S. Delabye; 2♀♀ as above but Mapanja sector, 11.v.2017, Mapanja camp (1800 m a.s.l.), N 4.1191°, E 9.1284°, lgt. V. Maicher, S. Delabye; 1♂ as above but 12.v.2017; 3♀♀ as above but 13.v.2017; 7♂♂6♀♀ as above but 14.v.2017; 1♂ as above but 15.v.2017; 2♀♀ as above but 22.x.2017; 1♂3♀♀ as above but 23.x.2017; 1♂3♀♀ as above but 25.x.2017; 2♂♂2♀♀ as above but 28.x.2017; 2♂♂ as above but 29.x.2017 (all above attracted by light); 1♀ as above but 9.iv.2015, PlanteCam camp (1100 m a.s.l.), N 4.1175°, E 9.0709° (bait-trapped).

Distribution

Until now, the species was known only from two males collected on Mount Cameroon: the first one in Buea, 800–1200 m, 21.iv.1902 (Berio 1935), and the second one labelled as Mount Cameroon, 4.iv.1958 (Häuser & Boppré 1997). According to the elevation indicated on the labels of both previously and newly collected specimens, the species occurs between 800 and 2200 m a.s.l., and seems to be restricted to submontane and montane forest (Fig. 1).

***Male genitalia* (Figs 16–17)**

Illustrated in Häuser and Boppré (1997). According to their drawing (p. 13) the elongate sclerotized process of valva seems to be straight. However, judging from our two dissected males this process is evenly and delicately curved inwardly what is, however, difficult to illustrate (Figs 16-17). That is why the drawing in Hauser & Boppré shows it clearly straight, in our opinion.



FIGURES 2–15 *Amerila* habitus; **2** *A. femina* ♂ pink form; **3** *A. femina* ♂ intermediate form; **4** *A. femina* ♂ brown form; **5** *A. femina* ♀ pink form; **6** *A. femina* ♀ brown form; **7** *A. luteibarba* ♂, **8** *A. luteibarba* ♀; **9** *A. mulleri* ♂; **10** *A. mulleri* ♀ with typical white abdomen; **11** *A. mulleri* ♀ with rare pinkish abdomen; **12** *A. niveivitrea* ♂; **13** *A. niveivitrea* ♀; **14** *A. roseomarginata* ♀; **15** *A. syntomina* ♂.

Description of female

Head. Frons and vertex pinkish rusty, each with a single central black spot; frons additionally with a pair of lateral, minute black spots near the eye margin; labial palps upcurved, rounded terminally, segment III half the length of the segment II, basal portion of each segment pink, terminal black with the segment III half black; scapus pink with black scales at its inner surface; flagellum filiform, uniformly ochraceous.

Thorax. Pale pinkish rusty above, slightly more intensively pink below, with minute blackish blotches at the base of fore and mid coxa; patagium with two distinct blackish blotches; tegula with two well defined black dots: one basoventral and one anterior; mesothorax with a blackish pattern: three pairs of parallel, subdorsal blotches, an additional pair of basolateral blotches partly covered by tegulae; foreleg: coxa pale rusty, with a blackish blotch

on its ventroproximal surface, femur dorsally intensive pinkish, ventrally pale rusty with a blackish dot terminally, tibia and tarsus dorsally pale rusty, ventrally pinkish; epiphysis more than 1/3 the length of tibia; middle and hindleg similar in the pattern and coloration, but hind tibia provided with two pairs of spines.

Abdomen. Dorsal segments with the gradually changing coloration from pale rusty to pinkish towards the termination, ventral segments monochromatically pale rusty; the blackish pattern consists of a series of six distinctive blotches at the lateral margin of each tergite and a series of small dots located between sternite and tergite just below each spiracle.

Forewing. Length 24–29 mm; upperside pale ochreous-brown; central area from the base to the postdiscal region semitransparent except for the densely scaled discal vein; the base of the radial veins with two black dots. Underside similar in the pattern and coloration but without the basal black dots.

Hindwing. Extensively semitransparent; upperside pinkish to pale ochreous depending on particular specimen; the coloration towards the margin gradually more intensive. Underside similar in pattern and coloration.

Female genitalia **(Fig. 25).** Papillae anales large, subsquare, terminally covered with dense setae; a pair of elongate membranous lobes ventrally, anteriorly from an oviduct; anterior apophyses short, thick, "thorn" like; posterior apophyses slender, one and half times as long as anterior apophyses; dorsal and ventral pheromone glands reduced; sternum VIII weakly sclerotized, posteriorly evenly emarginated, medially deeply divided by a wide longitudinal slit; ostium bursae wide, membranous; antrum short, membranous; ductus bursae straight, moderately elongate with the ventral wall membranous and dorsal wall sclerotized; corpus bursae oval, membranous, densely plicate with a prominent funnel shaped sclerotization; ductus seminalis slender, originating in the anterolateral portion of corpus bursae.

Remarks

The intensity of the pinkish suffusion of the head, thorax, hindwing and abdomen may vary substantially among specimens both in males (Figs 2–4) and females (Figs 5–6). In both sexes, the pink and pale ochraceous specimens are frequently encountered with all intermediate color forms. There are no detected differences between the color morphs in respect to male and female genitalia. The description of female is based on the examination of twenty specimens. The forewing length of forty studied males varies between 25–30 mm. The females were captured by both light catching and bait trapping.

Amerila luteibarba (Hampson, 1901) (Figs 7–8, 18–19, 26)

Material (7 specimens). 1♂ Mount Cameroon (SW slope), 27.xi.2016, Crater Lake (1500 m a.s.l.), N 4.1443°, E 9.0717°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek; 1♂ as above but 23.xi.2014, Elephant camp (1850 m a.s.l.), N 4.1453°, E 9.0870°; 1♂ as above but 7.xi.2016, Mann's Spring (2200 m a.s.l.), N 4.1428°, E 9.1226°; 1♂ as above but 9.xi.2016; 1♀ as above but 13.iv.2015, PlanteCam camp (1100 m a.s.l.), N 4.1175°, E 9.0709°; 1♂ as above but 14.iv.2015 (all above attracted by light); 1♂ as above but 30.xi.2014, Drink Gari camp (650 m a.s.l.), N 4.1014°, E 9.0610° (bait-trapped).

Distribution

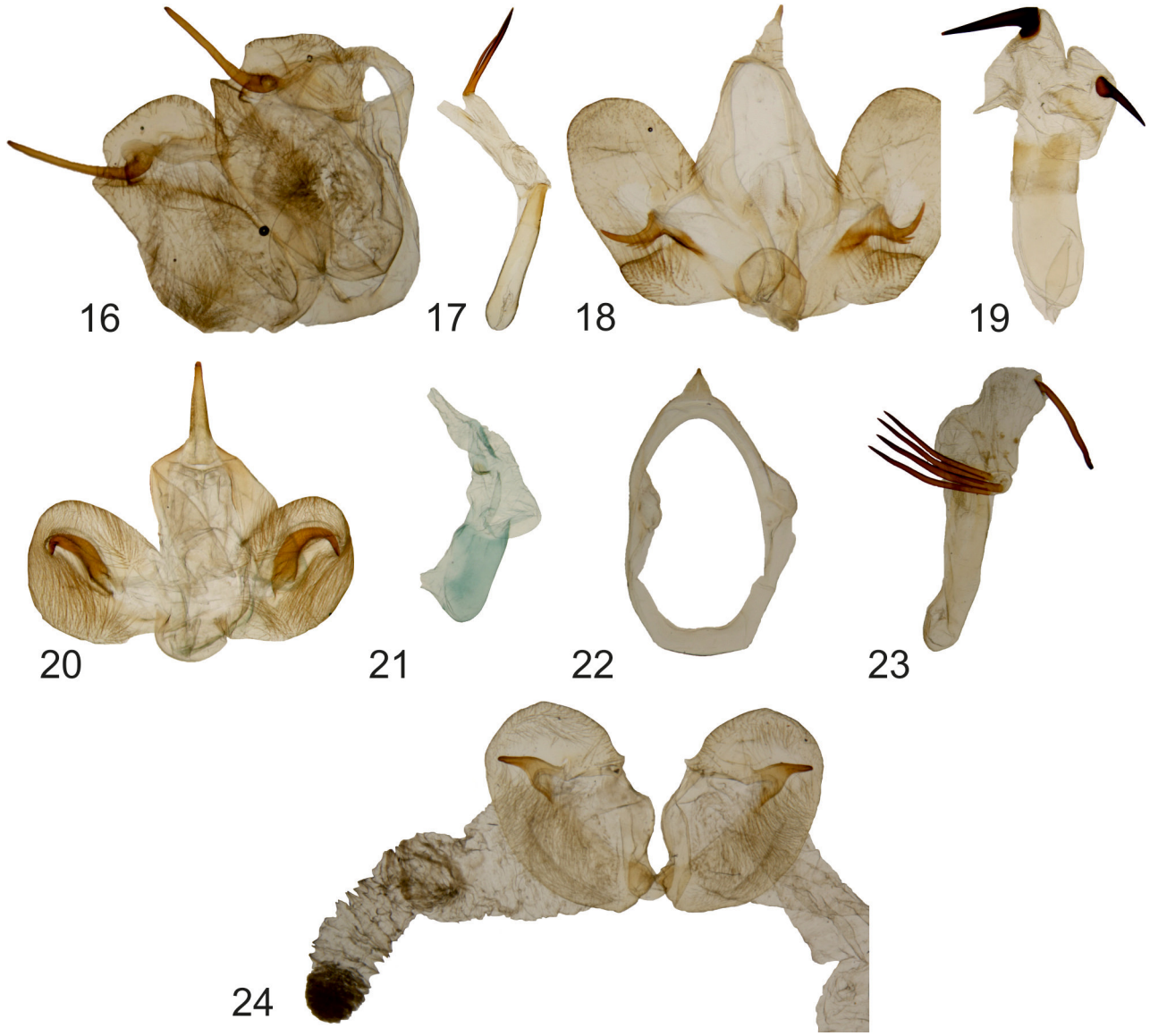
One of the most widespread species of the genus, although restricted to the Guineo-Congolian forest zone. Known from Sierra Leone to west Kenya (Kakamega Forest) and northwest Tanzania. On Mount Cameroon, it was collected from 650 m a.s.l. up to the timberline (Fig. 1).

Male genitalia (Figs 18–19)

Morphology of the studied specimen does not differ from those presented in Häuser & Boppré (1997).

Female genitalia **(Fig. 26)**

Papillae anales subsquare, terminally covered with sparse setae; a pair of minute but distinctive membranous lobes ventrally, anteriorly from oviduct; anterior apophyses moderate length, thick, "thorn" like; posterior apophyses narrower, twice as long as anterior apophyses, slightly flattened at apex; dorsal and ventral pheromone glands reduced; sternum VIII sclerotized, posteriorly evenly emarginated, divided medially by the membranous longitudinal concavity; ostium bursae wide, membranous; ductus bursae very short, membranous; corpus bursae oval, membranous, densely plicate; signum in the form of weakly expressed, sclerotized zone in the laterodistal portion of corpus bursae, additionally a pair of weakly sclerotized, narrow, elongate, parallel structures located on the opposite wall of corpus bursae; ductus seminalis slender, with wide entering, originating at the middle of corpus bursae.



FIGURES 16-24 Male genitalia of *Amerila* species; **16** *A. femina*; **17** aedeagus; **18** *A. luteibarba*; **19** aedeagus; **20** *A. mulleri*; **21** aedeagus; **22** *A. syntomina* tegumen; **23** aedeagus ; **24** valva.

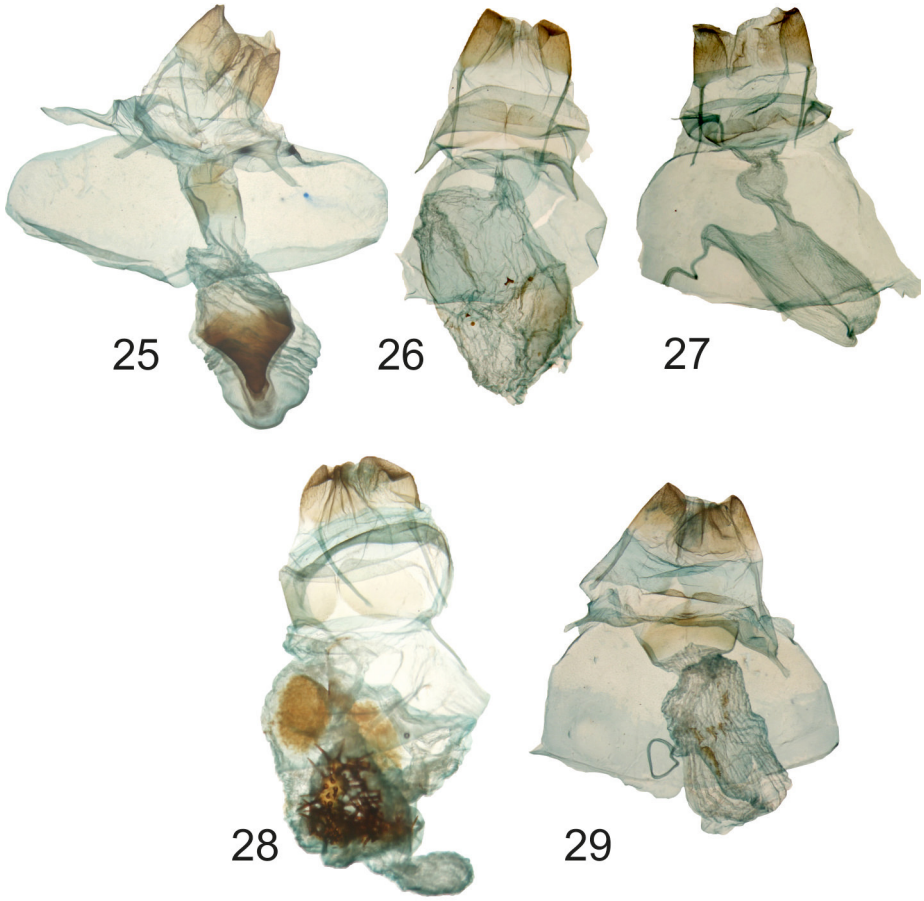
***Amerila mulleri* (Häuser & Boppré, 1997) (Figs 9–11, 20–21, 27)**

Material (30 specimens). 1♀ Mount Cameroon (SW slope), 25.xi.2016, Crater Lake (1500 m a.s.l.), N 4.1443°, E 9.0717°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek; 1♀ as above but 27.xi.2016; 1♂, 1♀ as above but 24.xi.2014, Elephant camp (1850 m a.s.l.), N 4.1453°, E 9.0870°; 1♀ as above but 20.iv.2017, lgt. V. Maicher, P. Potocký, S. Delabye; 2♀♀ as above but 6.xi.2016, Mann's Spring (2200 m a.s.l.), N 4.1428°, E 9.1226°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek; 2♂♂7♀♀ as above but 7.xi.2016; 1♀ as above but 8.xi.2016; 2♂♂2♀♀ as above but 9.xi.2016; 1♀ as above but 11.xi.2016; 1♂ as above but 18.iv.2017, lgt. V. Maicher, P. Potocký, S. Delabye; 1♀ as above but 19.iv.2017; 1♂ Mapanja sector; 14.x.2017, Mapanja camp (1800 m a.s.l.), N 4.1191°, E 9.1284°, lgt. V. Maicher, S. Delabye; 1♂ as above but 23.x.2017; 1♂ as above but 29.x.2017; 2♂♂1♀ as above but 26.x.2017 (all above attracted by light).

Distribution

The species range is probably underestimated due to the small number of available records. The species has earlier been recorded in several Eastern and Southern African localities. The northwesternmost locality is Ituri-Nioka near Albert Lake (northeast Democratic Republic of Congo). The new localities in Cameroon indicate that the species'

distribution in tropical Africa is substantially wider than was known before (by approximately 2300 km to the west). As several males and females were collected on Mount Cameroon over the four years of our sampling, there are no doubts about the existence of a stable population of *A. mulleri*. On Mount Cameroon it was collected from 1450 m a.s.l. up to the timberline, occurring mainly in the montane forest (Fig. 1).



FIGURES 25-29 Female genitalia of *Amerila* species; **25** *A. femina*; **26** *A. luteibarba*; **27** *A. mulleri*; **28** *A. niveivitrea*; **29** *A. roseomarginata.*

Male genitalia **(Figs 20–21)**

Morphology of one of the studied males (Fig. 20) shows some differences compared with the drawings published by Häuser & Boppré (1997), especially concerning the aedeagus structure. The aedeagus (Fig. 21) is at most two times longer than its width while the drawing suggests it is much longer. These differences reflect the weak sclerotization of the aedeagus typical for this species and are artificially produced during the mounting of the permanent genital slide. The aedeagus is delicate and prone to artificial distortion caused by the cover slip. The vesica bears medially a small plate-like sclerotization, as written in the original description of species but invisible on the illustration (Häuser & Boppré 1997).

Female genitalia **(Fig. 27)**

Papillae anales subsquare, terminally covered with sparse setae, bearing a pair of indistinctive membranous protuberances ventrally, anteriorly from oviduct; anterior apophyses moderate length, thick, slightly sinuose; apophyses posteriores narrower, almost three times as long as the anterior apophyses; dorsal and ventral pheromone glands reduced; sternum VIII moderately sclerotized in the form of a pair of small, flat, subsquare protrusions; ostium bursae wide, membranous; ductus bursae much shorter than corpus bursae, membranous with a distinct dilation at 1/3 of its length; corpus bursae oval, membranous, moderately plicate, without any trace of sclerotizations; ductus seminalis originating at the anterolateral portion of the corpus bursae, with very wide, gradually tapering opening.

Remarks

The morphological description of male provided in Häuser & Boppré (1997) requires some corrections based on the examined specimens. The information claiming forewing veins to be dark is misleading and can be misinter-

preted by readers. In fact, the veins of older specimens usually look dark, because the scales are worn off; but the scales of younger specimens could be removed also accidentally during their spreading in the laboratory. Actually, the dark coloration comes from the chitin sclerotization of veins. Such a trait, although easily visible in the lighter species, should not be treated as diagnostic feature. In fact, the entire wing of the undisturbed specimens is always covered by white scales (Fig. 9-10). We did not examine the types of *A. mulleri*, however, we are convinced that this character is artificial based on the comparison of many specimens representing both sexes of *A. mulleri*. Similar "dark veins" can be seen in some other taxa referred in Häuser & Boppré (1997), *A. bubo* (Walker, 1855) and *A. nigrivenosa* (Grünberg, 1910). In fact, none of these have diagnostically darker veins caused by any dark (blackish) scales.

Another mistake concerns the number of dark dots on tegula referred to regarding most species in Häuser & Boppré (1997). The authors recognized only the anterior and posterior dots, omitting the additional, often prominent dot located in many species basoventrally between the ventral margin of patagium and the base of forewing. Taking this into consideration, *A. mulleri* possesses two well defined black dots on tegula: basoventral and anterior. This observation is also based on our examination of numerous specimens representing various *Amerila* species.

The relatively high number of available females in our material (17 specimens) allowed revealing of a so far unknown phenotypic variation in the coloration of abdominal tergites. The typical and commonest form was entirely white (Fig. 10), while part of the specimens (three in our material) differed by a pinkish suffusion in the distal half of abdomen (Fig. 11). These forms do not differ in their genitalia morphology.

Amerila niveivitrea (Bartel, 1903) (Figs 12–13, 28)

Material (3 specimens). 1♀ Dom Forest, NW Province, 28-29.xi.2011, 1850-2100 m a.s.l., N 6.3570°, E 10.6088°, lgt. R. Tropek, P. Jansta, D. Lestina; 1♂ Mount Cameroon (SW slope), 6.xi.2016, Mann's Spring (2200 m a.s.l.), N 4.1428°, E 9.1226°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek (the latter two attracted by light); 1♀ as above but 10.iv.2015, PlanteCam camp (1100 m a.s.l.), N 4.1175°, E 9.0709° (bait-trapped).

Distribution

One of the most widespread *Amerila* species, known from 14 countries in sub-Saharan Africa. In Cameroon, it was recorded from Southwest and Northwest Provinces. On Mount Cameroon, *A. niveivitrea* was recorded only between 1100 and 2200 m a.s.l. (Fig. 1).

***Female genitalia* (Fig. 28)**

Papillae anales subsquare, terminally covered with dense setae; a pair of elongated membranous protuberances ventrally, anteriorly from the oviduct; protuberances distinctly wide and shallow proximally, then gradually tapering and more conspicuous distally; anterior apophyses moderate length, straight, not triangular; apophyses posteriores of the same width, 50 percent longer than the anterior apophyses; dorsal and ventral pheromone glands reduced; sternum VIII moderately sclerotized with a pair of small, rounded protrusions raised towards the median line of the body; ostium bursae wide, sclerotized; ductus bursae much shorter than its width, membranous; corpus bursae forming an irregular, ovoid, densely plicate pouch with several small, spiny, heavily sclerotized signa; single, elongate near the origin of the ductus seminalis and several minute sclerotizations forming an irregular line in the proximal section of corpus bursae; ductus seminalis narrow, originating from the slightly convex medio-lateral portion of the corpus bursae.

Remarks

Female genitalia were briefly described in Häuser & Boppré (1997), but have not been illustrated anywhere yet.

Amerila roseomarginata (Rothschild, 1910) (Figs 14, 29)

Material (1 specimen). 1 ♂ Mount Cameroon (SW slope), 1.ii.2016, PlanteCam camp (1,100 m a.s.l.), N 4.1175°, E 9.0709°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek (attracted by light).

Distribution

A very common species frequently collected across equatorial Africa. It is sparsely distributed from the Ivory Coast to the eastern regions of Kenya and Tanzania with some gaps most probably caused by the insufficient faunistic

exploration in many countries. The present record (Fig. 14) is the first one for Cameroon, suggesting that the species might have a continuous range in tropical Africa. On Mount Cameroon, only a single specimen was collected at 1150 m a.s.l. (Fig. 1).

***Female genitalia* (Fig. 29)**

Papillae anales subsquare, terminally covered with sparse setae; separated ventrally by a pair of elongated membranous protuberances, anteriorly from the oviduct; anterior apophyses moderate length, straight; apophyses posteriores narrower, one-third longer than anterior apophyses; dorsal and ventral pheromone glands reduced; sternum VIII sclerotized, forming a pair of prominent, flat, subsquare protrusions; ostium bursae wide, membranous; ductus bursae much shorter than its width, membranous; corpus bursae forming an irregular pouch with two sclerotized, flat surfaces in the proximal section and extensive irregular signum bursae with numerous, sharp, elongate spines in the distal section, terminating in a small, papilla-like appendix bursae; ductus seminalis narrow, arising from the anteromedian portion of the bursa.

Remarks

Female genitalia have neither been described nor illustrated before. The species identity of the collected specimen is confirmed by the key characters of imago provided by Häuser & Boppré (1997).

Amerila syntomina (Butler, 1787) (Figs 15, 22-24)

Material (1 specimen). 1 ♂ Mount Cameroon (SW slope), 17.iv.2015, Bamboo camp (350 m a.s.l.), N 4.0879°, E 9.0505°, lgt. V. Maicher, Sz. Sáfián, Š. Janeček, R. Tropek (attracted by light).

***Male genitalia* (Figs 22–24)**

Tegumen (Fig. 23) narrow, pedunculus broadened, directed posteriorly; uncus very small, triangular, pointed apically, not longer than the dorsal part of tegumen; vinculum long, slender; saccus reduced; valva (Fig. 22) large, ovoid, its outer surface with the long, protrudable, tube-like coremata, its inner surface with a horn-like sclerotized process slightly curved and apically pointed, not reaching the outer margin of valva; phallus (Fig. 24) straight, weakly sclerotized; vesica shorter than the phallus with four large, elongate, basally not fused, sharply pointed cornuti in the basal zone and additionally a single, similarly long but apically rounded cornutus in its terminal section.

Distribution

The species is known from the Afrotropical forests from Guinea through the Congo-Guinean basin to Tanzania, but the real distribution is still dubious due to the mistake by Häuser & Boppré (1997) discussed below. Mount Cameroon is the only known locality in Cameroon, we collected a single specimen at 350 m a.s.l. (Fig. 1).

Remarks

Previously, *A. syntomina* was reported from Cameroon only by Gaede (1926), without any locality or other specific data.

The illustrations of male genitalia provided by Häuser & Boppré (1997: plate 13) are incorrect. Examination of the types of both *A. syntomina* and *A. syntomina rubondoi* by the third author (GyML) revealed that these taxa represent two distinct species. Häuser & Boppré did not examine the type of *A. syntomina* and they mistakenly assumed that ssp. *rubondoi* has identical male genitalia to the nominotypical subspecies. Consequently, the illustrated genitalia did not belong to *A. syntomina*, but to *rubondoi*. We illustrate the male genitalia of *A. syntomina* for the first time (Figs. 22 and 23), they are identical to that of this taxon lectotype (housed at the NHMUK). As the complete taxonomic revision of the *A. syntomina* species group exceeds the scope of this paper, the revision clarifying taxonomy of the species group will be prepared as a separate publication in the near future.

DISCUSSION

The present study highlights the need of further investigations of the genus *Amerila*, despite being considered among the most studied Afrotropical tiger moths. By our recent material, the number of species recorded from Cameroon has been raised from 11 to 13. Additionally, we described the unknown female of *A. femina*, which is considered endemic for Mount Cameroon, and illustrated and described the female of *A. niveivitrea* in more detail.

The different color forms identified morphologically as endemic *A. femina* represent a single taxon to our

knowledge, such phenotypic variation was not distinguishable from the only two previously collected males so far available in collections. The newly collected material unveiled the surprising coloration variability ranging from the completely vivid pinkish hindwings overflowing most of the abdomen, to uniformly ochraceous specimens that are devoid of any trace of the pinkish scales. Specimens with an intermediate colouration were found as well.

The study of rather limited number of taxa represented by females revealed that the morphology of the female reproductive organs may serve as a valuable tool for species distinguishing and identification. The analyzed genitalia of five available species (*femina*, *luteibarba*, *mulleri*, *niveivitrea*, *roseomarginata*) differed significantly in morphology of both ductus bursa which may vary in its length and the degree of sclerotization and bursa copulatrix which can be densely plicate or smooth and may bear or not a very diverse morphologically signum. One may expect that the remaining species of *Amerila* express also such significant diversity of the morphology of female genitalia. We are convinced that after a detailed morphological study of more species it can be utilized in the determination keys, especially considering the external similarity of both *Amerila* sexes.

We also confirmed the unique faunistic character of Mount Cameroon already noted in some previous lepidopterological studies (e.g., Maicher *et al*. 2016; Sáfián & Tropek 2016; Ustjuzhanin *et al.* 2018). In this aspect, we consider the additional specimens of the endemic *A. femina* of special importance. We have unveiled that most of the *Amerila* species recorded on Mount Cameroon occur in forests of higher elevations, including the endemic *A. femina*. Their diversity pattern thus differs from the mid-elevation peak of tiger moth diversity described from the mountain (Maicher *et al.*, unpublished data). Simultaneously, it is also another undeniable argument for protection of the upper elevations of the mountain. Furthermore, our results proved that local surveys of Lepidoptera diversity can be of a substantial scientific value, especially in such understudied region as the Afrotropics.

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