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Contribution to the knowledge of the Carpenter Moths (Lepidoptera, Cossidae) of the Maputo Special Reserve in South Mozambique with description of two new species

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Received 17 January 2020 | Accepted by V. Pešić: 17 February 2020 | Published online 23 February 2020.

Abstract

Present paper contains the first comprehensive summary of the Cossidae of the Maputo Special Reserve (South Mozambique), including ten species. Two species are described as new to science: *Afrikanetz smithi* Yakovlev & László **sp. n.** and *Brachylia maputo* Yakovlev & László **sp. n.** Three species are reported from Mozambique for the first time. With 14 colour and 2 black and white figures.

Key words: Cossidae, new species, taxonomy, faunistics, species list, Afrotropics, Maputo Special Reserve, Mozambique.

Introduction

Cossidae is a family of Lepidoptera including over 1200 valid species (van Nieukerken *et al.* 2011; Yakovlev 2011). In the last decade, there has a significant progress been achieved concerning the study of African Cossidae. Numerous new genera and species have been described, and the fauna of several African countries has been revised resulting in publications on the Cossidae of Malawi, Zimbabwe, Zambia, Swaziland, South Africa, Namibia, Central African Republic, Gabon, Sierra Leone, Angola, Burundi and Rwanda (Yakovlev & Lenz 2013; Yakovlev & Murphy 2013; Yakovlev 2014; Mey 2015, 2016, 2017; Yakovlev *et al.* 2018; Yakovlev *et al.* 2019a, b, c; Yakovlev & Witt 2019a, b).

The knowledge on the Cossidae of Mozambique has been rather incomplete until now. According to the Afromoths website (De Prins & De Prins 2020) there are altogether 11 species recorded from the country. The knowledge on the Lepidoptera of Mozambique has significantly been increased thanks to a recent joint research project of the African Natural History Research Trust (ANHRT), the Natural History Museum of Maputo (MHNM) and the National Administration of Conservation Areas (ANAC) aiming to

obtain a comprehensive inventory of the Lepidoptera fauna of the Maputo Special Reserve. As a result of three consecutive sampling expeditions organized by the African Natural History Research Trust between November 2016 and February 2018 an extensive Lepidoptera material has been collected. The material is currently under scientific treatment and the results are intended to be published in a series of papers devoted to different Lepidoptera groups. The first two papers with regards to the Maputo Special Reserve were published recently providing descriptions of two new *Tumicla* (Lithosiini, Arctiinae, Erebidae) species (Volynkin & László 2018) and two new Nolini (Nolinae, Nolidae) species (László & Vetina 2019). This present paper is the third publication devoted to the Lepidoptera of the Reserve.

Maputo Special Reserve is located in the southernmost part of Mozambique covering 77400 ha connected to the border of South Africa, as part of the Libombo Transfrontier Conservation Area (Smith *et al.* 2008). The history, habitats and importance of the reserve were briefly summarized by László & Vetina (2019).

The climate in the region is subtropical, characterised by a hot and rainy summer (September-April) and moderate to warm, relatively drier winter periods (March-October) (Guldmond & van Aarde 2010). The average annual rainfall in the reserve is 765–768 mm, while the average annual temperature is 22.4–22.45 °C (Jacobs *et al.* 2010). Maximum precipitation and temperature coincide in January, extending the hot and humid condition until March (Silva & Rafael 2014). The annual relative humidity in the region is about 76% and normal wind speed ranges from 10-30 km/h, frequently northerly during the rainy season and south-easterly in the dry season (Silva & Rafael 2014).

Maputo Special Reserve lies in the Southern part of the East African Coastal Forest Mosaic Biotic Zone, characterized by the Tongaland-Pondoland East African coastal mosaic vegetation type (Happold & Lock 2013). Despite the low elevation that rarely exceeds 50 m a. s. l., the narrow coastal zone is home to rather diverse vegetation and numerous endemic plant species. In the Maputo Special Reserve there have not less than 18 habitat types been recognized as follows: Sand Forest, Sand Forest-Woodland Mosaic, Sand Thicket, Dune Forest, Woodland, Open Woodland, Woody Grassland, Maputo River Floodplain, Hygrophilous Grassland, Lacustrine Reedbed, Dune Grassland, Futi Riverine Vegetation, Tidal Wetland, Mangrove, Swamp Forest, Eucalyptus Plantation, Lake, Rivers and Oceans, Beach (de Boer *et al.* 2000). During the sampling expeditions, we aimed to obtain representative Lepidoptera samples in all possible habitat types (Figs 1–2).



Figure 1. Maputo Special Reserve, typical habitat (photo by G. László).

Material and methods

The Cossidae specimens were collected by various means of light trapping, applying light house illuminated by 125W Mercury vapor bulb and automatic bucket traps equipped with 8W actinic light tubes. The collected material is deposited in the collection of African Natural History Research Trust, Leominster (ANHRT) and the Natural History Museum of Maputo (MHNM). The genitalia were dissected and stained with Eosin red and mounted in Euparal on microscope slides applying standard methods of preparation (Lafontaine & Mikkola 1987). The adults were photographed using a Nikon D700 camera equipped with Nikkor AF-S Micro 105 mm lens. The genitalia preparations were photographed using a Tucsen H series digital microscope camera mounted on a Nikon SMZ1500 stereomicroscope.

Abbreviations of the depositories used:

ANHRT – African Natural History Research Trust, Leominster, UK;

MfN – Museum für Naturkunde, Berlin, Germany;

MHNM – Museu de História Natural, Maputo, Mozambique;

MNHN – Muséum National d’Histoire Naturelle, Paris, France;

NHMUK (formerly BMNH) – The Natural History Museum (formerly British Museum of Natural History), London, UK;

TMSA – Ditsong National Museum of Natural History, Pretoria (formerly Transvaal Museum);

ZSM – Zoologische Staatssammlung, Munich, Germany.

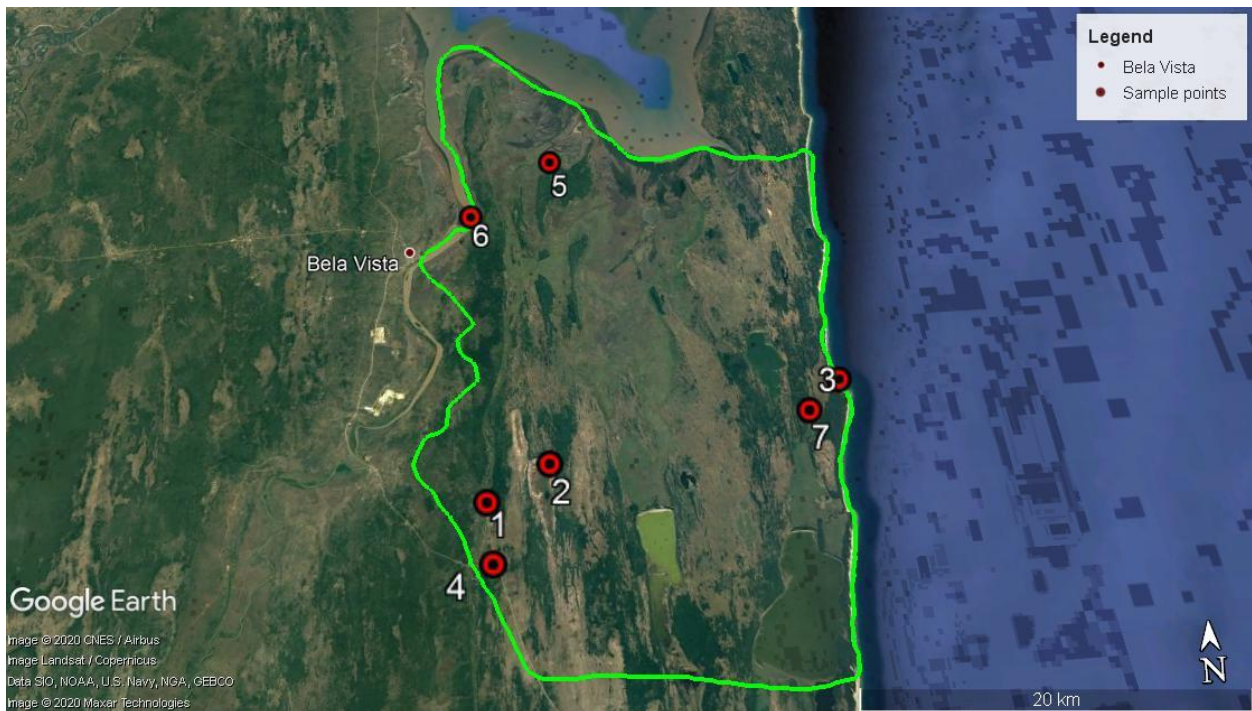


Figure 2. Map of collecting localities in the Maputo Special Reserve.

Results

Description of the new species

Afrikanetz smithi Yakovlev & László sp. n.

Figs 3–4, 15

<https://zoobank.org/urn:lsid:zoobank.org:act:15A75C76-C6D6-4E4F-8B1A-3DA49D2FB270>

Material. Holotype: male, Mozambique, Maputo Special Reserve, West Gate (Sand Thicket), 22 m, 26°30'14.2"S, 32°42'59.6"E, 21–30.xi.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22, ANHRTUK 00002157, Gen. Slide No.: ANHRT 00070 (ANHRT).

Diagnosis. The new species is easily distinguishable from the three known representatives of the genus: *A. bugvan* Yakovlev, 2009 (Type locality: Cote de Ivoire, Lamto), *A. inkubu* Yakovlev, 2009 (Type locality: Congo, Odzala N.P.), and *A. makumazan* Yakovlev, 2009 (Type locality: Arabia, Jedda) by its much less sharply defined brown spot of the forewing discal area, shorter and thicker phallus, and by its less developed ribs on the inner surface of the valva.

Description. Male. Length of forewing 15 mm. Antennae short, bipectinate, crest rami three times longer than antenna rod diameter. Tegulae and patagia grey. Forewing narrow, pale grey with thin blackish transverse lines in submarginal and postdiscal areas and a poorly visible brownish patch in discal area; basal area grey without pattern. Hind wing pale grey, with faint pattern of strokes in cubital area.

Male genitalia. Uncus long, robust, distally tapered, apically rounded; gnathos arms long, thick; gnathos compact, covered with tiny spines; valva relatively narrow, long, membranous in distal quarter with a pronounced ledge on costal margin; transitional area between sclerotized membranous part with three transverse ribs on inner surface of valva, the middle one of them more developed than the other two; transtilla process relatively short, medially curved, apically tapered, pointed; juxta robust, with relatively large, diverged lateral processes; saccus semicircular, medium sized, phallus short (somewhat shorter than valva), thick, slightly curved in medium third, with small spike ventrally, vesica aperture in dorso-apical position, equal to 1/3 of phallus in length, with two small spines on vesica aperture edge, vesica without cornuti.

Female unknown.

Etymology. The new species is named after Mr. Richard Smith (Leominster, U.K.), founder of the ANHRT, organizer of extensive entomological exploratory program in Subsaharan Africa.

***Brachyilia maputo* Yakovlev & László sp. n.**

Figs 5–6, 16

<https://zoobank.org/urn:lsid:zoobank.org:act:D8135144-8F96-4D12-A5CB-9E94C51948F9>

Material. Holotype: male, Mozambique, Maputo Special Reserve, West Gate (Sand Thicket), 22 m, 26°30'14.2"S, 32°42'59.6"E, 21–30.xi.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22, ANHRTUK 00011141, Gen. slide No.: ANHRT 00071 (ANHRT).

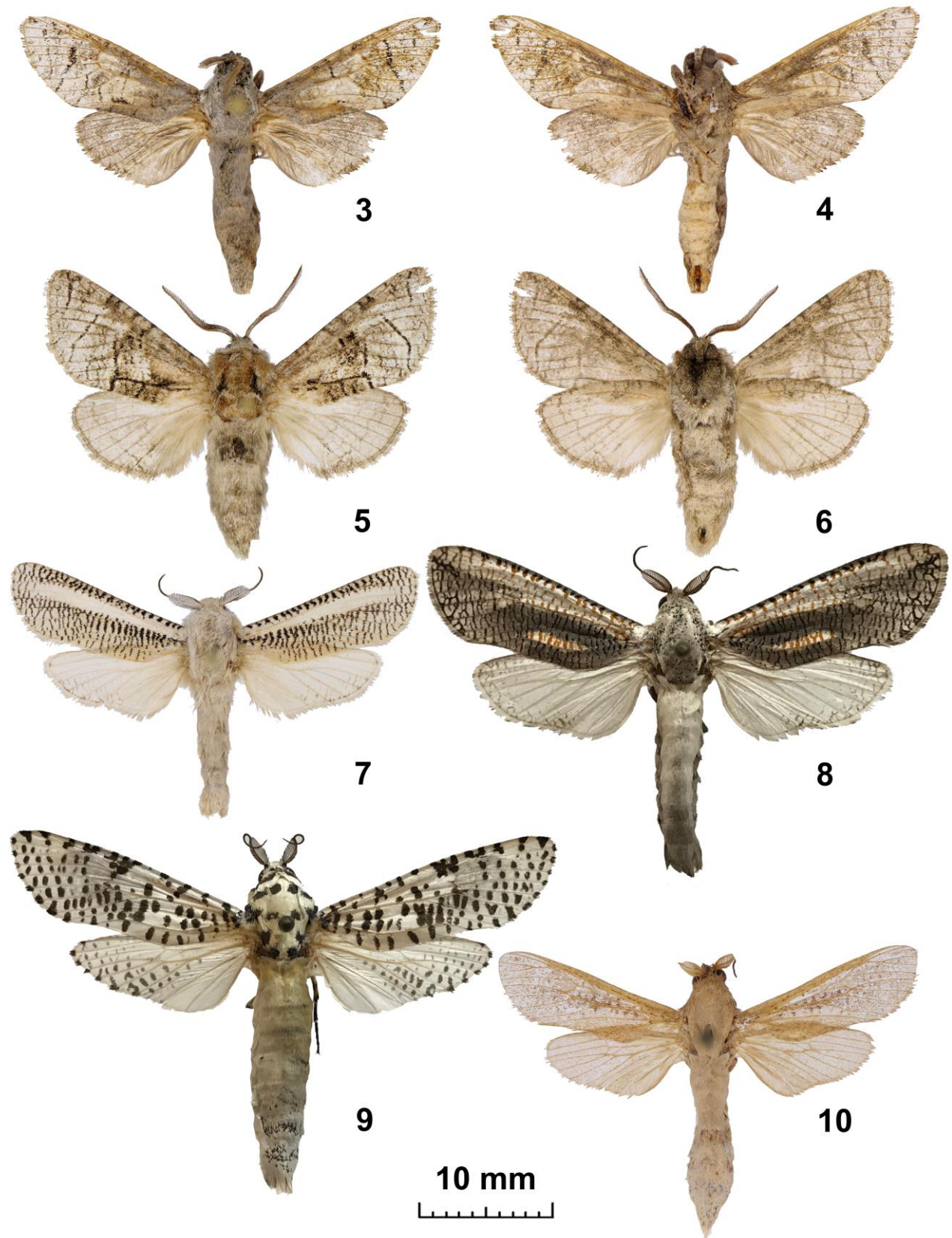
Diagnosis. The new species resembles externally *B. terebroides*, but differs from it by its much lighter coloration, longer uncus, more straight and narrower transtilla processes, and almost straight phallus that is strongly curved in *B. terebroides*.

Description. Male. Length of forewing 14 mm. Antennae bipectinate, rather long, equal in length to 3/5 of fore wing costal margin, crest rami three times longer than antenna rod diameter. Tegulae pale brown. Head and abdomen densely covered with pale grey scales. Forewing wide, apically rounded, pale grey with thin blackish undulated transverse lines in submarginal, postdiscal and discal areas; pale brown spot in discal area blurred; fringe pale brownish grey, unicolorous. Hind wing pale grey with a more or less parallel series of poorly visible undulated thin greyish lines.

Male genitalia. Uncus robust, triangle, apically rounded, relatively short; gnathos arms thick, long; gnathos robust, densely covered with tiny spines; valva membranous distally with a small crest with pointed prong-like process on costal margin at the transition between the sclerotized and membranous areas of valva; transtilla process long, thin, medially curved, apically pointed; juxta robust, with large, widely diverged lateral processes; saccus semicircular, robust; phallus almost straight, somewhat shorter than length of valva, thick, apex obliquely cut, vesica aperture in dorso-apical position, equal to 1/4 of phallus in length, vesica without cornuti.

Female unknown.

Etymology. The new species is named after the capital of Mozambique.



Figures 3–10. Cossidae, adults (all from ANHRT): 3. *Afrikanetz smithi* Yakovlev & László sp. n., holotype, dorsal; 4. *Afrikanetz smithi* Yakovlev & László sp. n., holotype, ventral; 5. *Brachylia maputo* Yakovlev & László sp. n., holotype, dorsal; 6. *Brachylia maputo* Yakovlev & László sp. n., holotype, ventral; 7. *Azygophleps asylas* (Cramer, 1779), ♂; 8. *Azygophleps inclusa* (Walker, 1856), ♂; 9. *Azygophleps leopardina* Distant, 1902, ♂; 10. *Phragmataecia irrorata* Hampson, 1910, ♂.

Remark. Mey (2016, 2017) revised the genus *Brachyilia* Felder, 1874 (type species, by monotypy – *Brachyilia terebroides* Felder, 1874), describing seven new species from South Africa, and also provided diagnoses of the previously known species.

List of species

Afrikanetz smithi Yakovlev & László **sp. n.**

Distribution: Maputaland, Mozambique.

Brachyilia maputo Yakovlev & László **sp. n.**

Distribution: Maputaland, Mozambique.

Azygophleps asylas (Cramer, 1779)

Fig. 7

Phalaena asylas Cramer, 1779: 62, pl. 137, Fig. C.

Type locality: South Africa, Northern Cape, ‘Spitzkop, C[ape] P[rovince]/nr. Prieska.

Type material: Neotype in TMSA (Mey 2019).

Distribution: Southern Africa: Angola, Botswana, Mozambique, Namibia, Republic of South Africa, Swaziland, Zimbabwe (Dewitz 1881; Mey 2019; Pinhey 1975); Rwanda (Yakovlev & Witt 2019b).

Material examined. Mozambique, Maputo Special Reserve. 24 males, 4 females, West Gate (Sand Thicket), 22 m, 26°30'14.2"S, 32°42'59.6"E, 10–17.ii.2018, MV Light Trap, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2; 27 males, 2 females, from the same locality, but collected on 21–30.xi.2016 by Aristophanous, M., Cristovao, J., László, G., and Miles, W.; 1 male, same site and collectors but collected on 3–13.xii.2016, ANHRT:2017.22; 5 male, Ponta Milibangalala (Dune grassland), 15 m, 26°26'58.6"S, 32°55'29.8"E, 17–21.ii.2018, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2; 4 males, from the same locality, but collected at 30.xi.–3.xii.2016, by Aristophanous, M., Cristovao, J., László, G., and Miles, W., ANHRT:2017.22; 7 males, Futi Corridor (Sand Forest Woodland Mosaic), 17 m, 26°32'10.1"S, 32°43'09.7"E, 23–24.ii.2018, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2, Gen. slide No.: ANHRT 00074; 9 males, Hygrophilous Grass-Sand Forest Ecotone, 26°28'32.6"S, 32°45'7.7"E, 10.xii.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22 (ANHRT and MHNM).

Azygophleps inclusa (Walker, 1856)

Fig. 8

Zeuzera inclusa Walker, 1856: 1534

Type locality: Port Natal [Durban, South Africa].

Type material: Holotype in NHMUK, examined.

Distribution: Angola, Botswana, Burundi, Côte d'Ivoire, D.R. Congo, Djibouti, Eritrea, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Oman, Rwanda, Saudi Arabia, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Uganda, Yemen, Zambia, Zimbabwe (Berio 1939; Fletcher 1968; Grünberg 1910; Hacker *et al.* 1999; Mey 2016; Pinhey 1975; Rougeot 1977; Sharpe 1902; Szent-Ivány 1942; Vári *et al.* 2002; Wiltshire 1985; Wiltshire 1986; Yakovlev 2011; Yakovlev & Witt 2019a, b).

Material examined. Mozambique, Maputo Special Reserve. 2 males, West Gate, Sand Forest, 22 m, 26°30'14.2"S, 32°52'49.6"E, 13–15.ii.2018, MV Light Trap, László, G., Mulvaney, J., Smith, L. leg. ANHRT:2018.2 (ANHRT); 1 male, Ponta Milibangalala (Dune Grassland), 26°26'58.6"S, 32°55'29.8"E, 15 m, MV Light trap, 25–30.V.2017, Aristophanous, M., László, Gy., Miles, W., Vetina, A. leg., ANHRT:2017.26 (ANHRT).

***Azygophleps leopardina* Distant, 1902**

Fig. 9

Azygophleps leopardina Distant, 1902: 213–214.

Type locality: Transvaal, Pretoria.

Type material: Holotype in NHMUK, examined.

Distribution: Angola, Botswana, Kenya, Malawi, Namibia, South Africa, Swaziland, Zambia, Zimbabwe (Grünberg 1910; Mey 2016; Pinhey 1975; Yakovlev 2011; Yakovlev & Murphy 2013; Yakovlev *et al.* 2019), Mozambique.

Material examined. Mozambique, Maputo Special Reserve. 8 males, Ponta Milibangalala (Dune grassland), 15 m, 26°26'58.6"S, 32°55'29.8"E, 17–21.ii.2018, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2; 2 males, Mangrove Camp (Mangrove/Woodland Mosaic), 26°19'35.9"S, 32°42'35.7"E, 7–9.xii.2016, MV Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22 (ANHRT and MHNM).

Remark. New country record for Mozambique.

***Phragmataecia irrorata* Hampson, 1910**

Fig. 10

Phragmataecia irrorata Hampson, 1910: 128.

Type locality: Mashonaland [Zimbabwe].

Type material: Cotypes in NHMUK, examined.

Distribution: Southern Africa: Zimbabwe (Hampson 1910), Botswana, Mozambique, Malawi, Republic of South Africa, Zambia (Pinhey 1975), Namibia (Yakovlev 2011; 2015).

Material examined. Mozambique, Maputo Special Reserve. 3 males, West Gate (Sand Thicket), 22 m, 26°30'14.2"S, 32°42'59.6"E, 21–30.xi.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg. ANHRT:2017.22, Gen. slide Nos: ANHRT 00072, 00073; 1 male, Mangrove Camp (Mangrove/Woodland Mosaic), 26°19'35.9"S, 32°42'35.7"E, 7–9.xii.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT: 2017.22 ANHRT: 2017.22; 1 male, Ponta Milibangalala (Dune Grassland – Dune Forest Ecotone), 15 m, 26°26'58.6"S, 32°55'29.8"E, 30.xi.–3.xii.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22 (ANHRT and MHNM).

***Aethalopteryx atriplaga* (Le Cerf, 1919)**

Fig. 11

Azygophleps atriplaga Le Cerf, 1919: 30.

Type locality: Rivière Kuando, frontière Sud-Est Angola-Rhodesia [Kwando Riv., W. Angola].

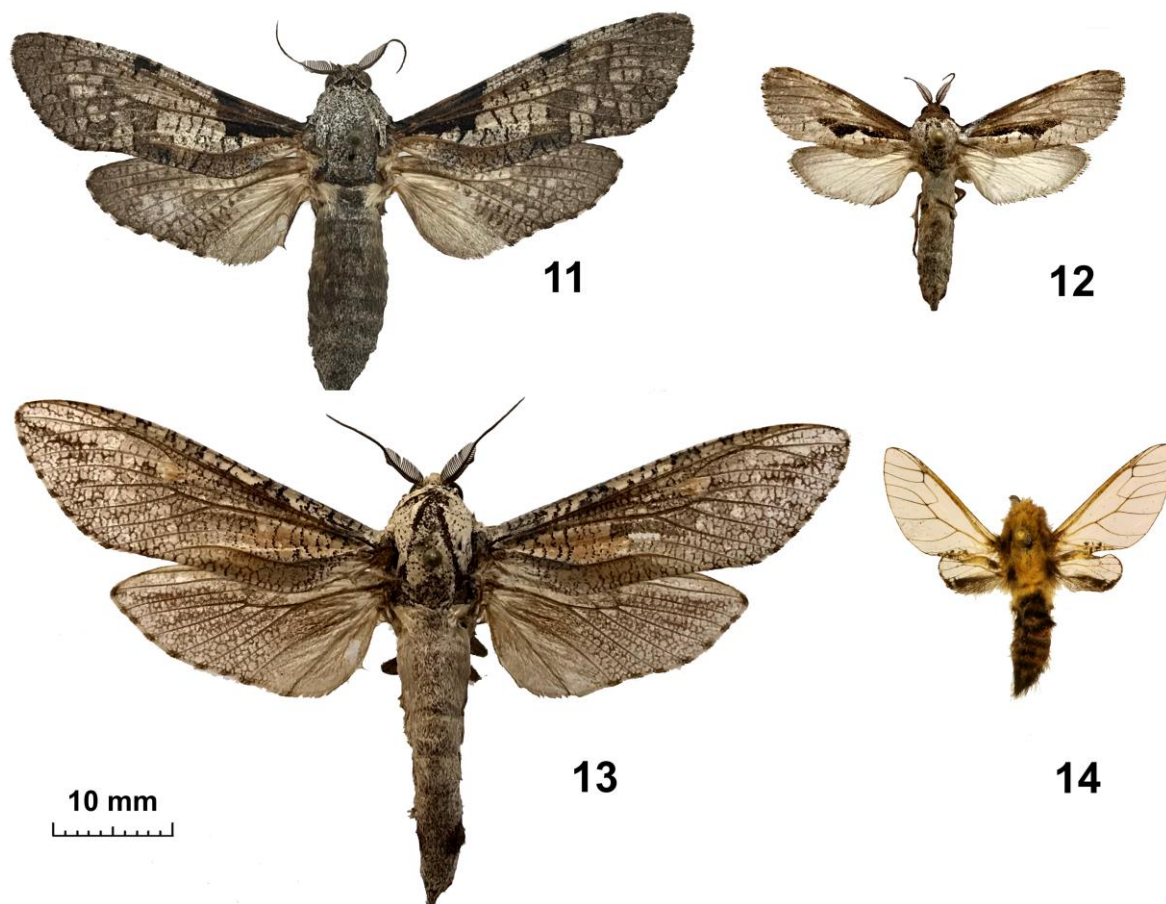
Type material: Holotype in MNHN, examined.

Distribution: Angola, Namibia (Clench 1959), Mozambique.

Material examined. Mozambique, Maputo Special Reserve. 9 males, West Gate, Sand Forest, 22 m, 26°30'14.2"S, 32°52'49.6"E, 3–13.xii.2016, MV Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22; 15 males, same locality and collectors, but collected at 21–30.xi.2016 in Sand Thicket habitat, ANHRT:2017.22; 18 males, from the same locality, but collected at 13–15.ii.2018 by László, G., Mulvaney, J., Smith, L. in Sand Forest habitat, ANHRT:2018.2, Gen. slide No.: ANHRT 00055; 6 males, Ponta Milibangalala (Dune grassland), 15 m, 26°26'58.6"S, 32°55'29.8"E, 17–21.ii.2018, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2; 2 males, Ponta Milibangalala (Dune Grassland – Dune Forest Ecotone), 15 m, 26°26'58.6"S, 32°55'29.8"E, 30.xi.–3.xii.2016, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22; 4 males, Futi Corridor (Sand Forest Woodland Mosaic), 17 m, 26°32'10.1"S, 32°43'09.7"E, 23–24.ii.2018, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2; 1

male, West Gate (Futi Riverine Vegetation), 26°29'51.4"S, 32°43'3.2"E, 5.xii.2016, Light Trap, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22 (ANHRT and MHNM).

Remark. New country record for Mozambique.



Figures 11–14. Cossidae, adults (all from ANHRT): 11. *Aethalopteryx atriplaga* (Le Cerf, 1919), ♂; 12. *Aethalopteryx tristis* (Gaede, 1915), ♂; 13. *Strigocossus capensis* (Walker, 1856), ♂; 14. *Eulophonotus myrmeleon* Felder, 1874, ♂.

***Aethalopteryx tristis* (Gaede, 1915)**

Fig. 12

Aethalopteryx tristis Gaede, 1915: 147–148

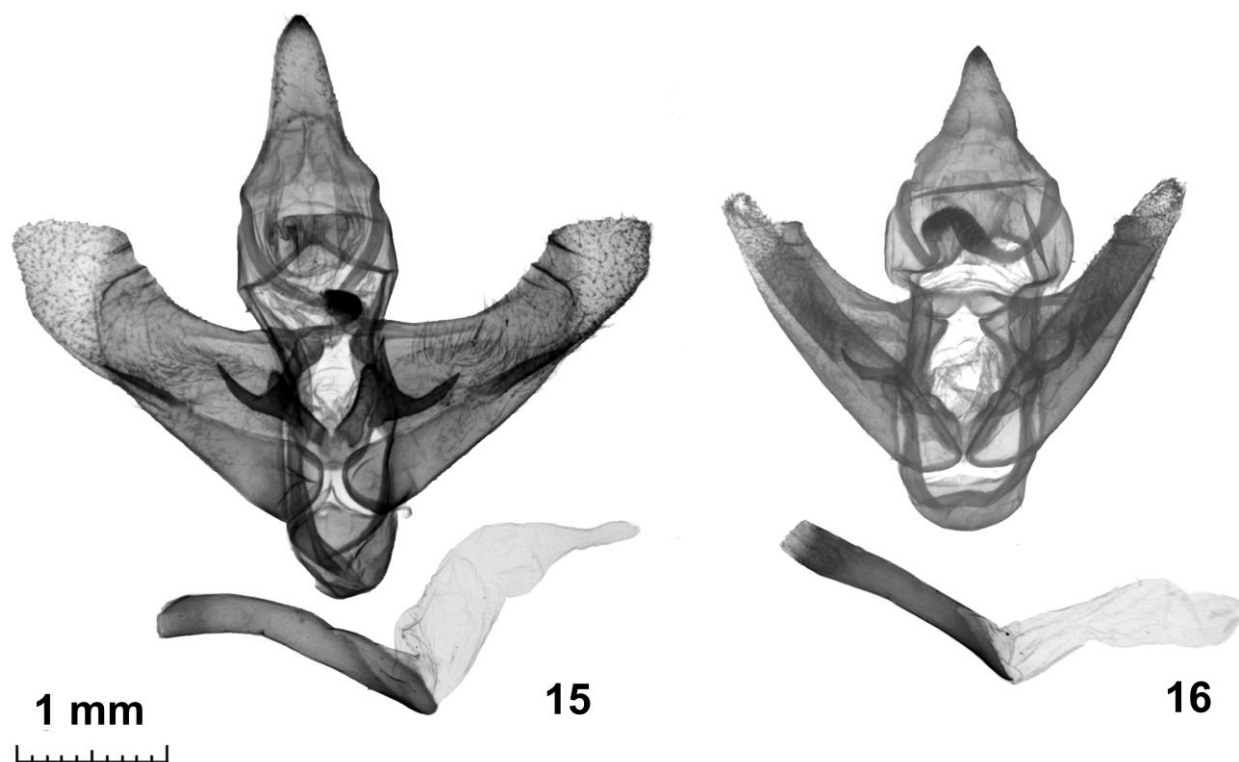
Type locality: [Namibia], D.[eutsch] S.[üd] W.[est] Afr.[rika], S Namaland, Kuibis.

Type material: Holotype in MfN, examined.

Distribution: Southern Africa: Angola, Botswana, Malawi, Namibia, Republic of Southern Africa, Swaziland) (Vári et al. 2002; Yakovlev & Murphy 2013; Mey 2016; Yakovlev & Witt 2016; Yakovlev et al. 2019), Mozambique.

Material examined. Mozambique, Maputo Special Reserve. 1 male, West Gate (Sand Thicket), 22 m, 26°30'14.2"S, 32°42'59.6"E, 21–30.xi.2016, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22; 1 male, Ponta Milibangalala (Dune Grassland – Dune Forest Ecotone), 15 m, 26°26'58.6"S, 32°55'29.8"E, 30.xi.–3.xii.2016, Aristophanous, M., Cristovao, J., László, G., Miles, W. leg., ANHRT:2017.22 (ANHRT).

Remark. New country record for Mozambique.



Figures 15–16. Cossidae, male genitalia: 15. *Afrikanetz smithi* Yakovlev & László sp. n., Holotype (ANHRT Gen. Slide: 00070); 16. *Brachylia maputo* Yakovlev & László sp. n., Holotype (ANHRT Gen. Slide: 00071).

***Strigocossus capensis* (Walker, 1856)**

Fig. 13

Zeuzera capensis Walker, 1856: 1533.

Type locality: Port Natal [S. Africa, Natal prov.].

Type material: Holotype in NHMUK, examined.

Distribution: Angola, Burundi, D.R. Congo, Kenya, Malawi, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, Zambia, Zimbabwe (Le Cerf 1914; Holland 1920; Pinhey 1975; Yakovlev 2011; Mey 2016; Yakovlev & Witt 2019a, b; Yakovlev *et al.* 2019).

Material examined. Mozambique, Maputo Special Reserve. 2 males, West Gate (Sand Thicket), 22 m, 26°30'14.2"S, 32°42'59.6"E, 10–17.ii.2018, László, G., Mulvaney, J., Smith, L. leg., ANHRT:2018.2 (ANHRT).

***Eulophonotus myrmeleon* Felder, 1874**

Fig. 14

Eulophonotus myrmeleon Felder, 1874: 4; pl. 82, fig. 9.

Type locality: [South Africa, Western Cape, Cape of Good Hope], Cap. b.

Type material: Holotype in NHMUK, examined.

Distribution: Angola, Botswana, Cameroon, Congo, the Democratic Republic of the Congo, Cote d'Ivoire, Equatorial Guinea, Ethiopia, Ghana, Kenya, Mozambique, Namibia, Nigeria, Reunion, Sierra Leone, South Africa, Togo, Uganda, Zimbabwe (Trimen 1909; Lamborn 1914; Mayné 1917; Cotterell, 1930; Alibert 1951; Mallamaire 1956; Gardner 1957; Wagner *et al.* 2008; N'Guessan *et al.* 2010; Yakovlev 2011; Mey 2007, 2016; Prinsloo & Uys 2015; Yakovlev *et al.* 2019).

Material examined. Mozambique, Maputo Special Reserve. 1 male, Ponta Milibangalala (Dune Grassland), 26°26'58.6"S, 32°55'29.8"E, 15 m, MV Light trap, 25–30.v.2017, Aristophanous, M., László, Gy., Miles, W., Vetina, A. leg., ANHRT:2017.26 (ANHRT); 1 male, West Gate (Sand Forest), 22 m, 26°30'14.2"S, 32°42'59.6"E, 20.v.–9.vi.2017, Aristophanous, M., László, Gy., Miles, W., Vetina, A. leg., ANHRT:2017.26 (ANHRT).

Discussion

In total, 10 Cossidae species have been collected in the Maputo Special Reserve between November 2016 and February 2018. Three of them (*A. inclusa*, *S. capensis*, *E. myrmeleon*) are widely distributed throughout Sub-Saharan Africa, one of them is widespread in East Africa (*A. leopardina*), and four of them in Southern Africa (*A. asylas*, *Ph. irrorata*, *A. atriplaga*, and *A. tristis*). Three species, namely *A. tristis*, *A. leopardina* and *A. atriplaga* represent new country records for the fauna of Mozambique. The two species described as new to science (*A. smithi* and *B. maputo*) are probably local endemisms of the coastal forests in Southern Africa where these special habitats have remained in their largest existing areas in the Maputo Special Reserve.

Acknowledgments

The senior author is indebted to Mr. Geoff Martin and Mr. Alessandro Giusti (NHMUK, London) for their kind assistance provided during studying the type material of the Natural History Museum; moreover, to Mr. Richard Smith (ANHRT, Leominster) Dr. Axel Hausmann (ZSM, Munich), and Dr. Joel Minet (MNHN, Paris) for providing opportunity to study the collection of their institution. The third author is grateful to Mr Richard Smith (Trustee of ANHRT, Leominster) for facilitating his participation on the field work in the Maputo Special Reserve. Our special thanks go to the following co-operative partners in Mozambique for the diverse administrative and technical assistance provided during our field work in Maputo Special Reserve: Dr Bartolomeu Soto (Administração Nacional das Areas de Conservação, Maputo), Dr Lucilia Chuquela, Mrs Kisimenda Muambalo, Mr Anacleto Cossa (MHNM, Maputo), Mr Armando Guenha, Mr Miguel Goncalves, Mr Natercio Ngovene and Mr Brian Neubert (Maputo Special Reserve). The authors are also grateful to Anna Ustjuzhanina (Tomsk, Russia) for linguistic corrections of the manuscript and to Mr Tibor Csöväri (Budapest, Hungary) for preparing and imaging genitalia slides.

The authors declare that to the best of their knowledge they conform to the national regulations and meet with the conditions and requirements of International Conventions concerning collecting/export and handling of the specimens presented in this Article.

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