NOTE
Three undescribed females of the genus Zamarada Moore, 1887 (Lepidoptera: Geometridae: Ennominae)
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INTRODUCTION
More than 250 species constitute the genus Zamarada Moore, 1887. All are tropical or subtropical moths and the great majority of them are African natives. Few are found in the Arabian Peninsula and less than a dozen in Asia. The genus is homogeneous and some species possess interesting features: either they have a similar look (sibling species) but with clearly distinctive genitalia or, at the opposite, they have almost identical genitalia but display a quite different phenotype (external appearance).

Several species seem to be rare and are only known from one or a few male individuals. It is difficult to give a correct explanation, but some Zamarada fly only in restricted geographical areas. Also, in a general way, females are less attracted to light sources and their observations are consequently occasional. In addition, some species most probably have a weaker female sex-ratio.

DESCRIPTIONS

Zamarada chrysothyra Hampson, 1909
Originally described from a male collected by G. Legge & A.F.R. Wollaston in Uganda (at the time, a colony of the British East Africa), at Mokia, South-East of Ruwenzori, on 28 June 1906, « 3500 feet » (corresponding to about 1070 m). Fletcher (1974) mentions only 4 males, 3 from Uganda (Ankole, Kaysona; Bwamba; Masaka, Buddu) and 1 from Nigeria (Zungeru).

Examined material
1 ♀ : Burkina-Faso, Boromo, Forêt de Sorobouli; 11°46'53.8"N, 02°54'02.5"W; 247 m (Fig. 1); 04–05.vii.2013; UV light-trap ; Philippe Moretto leg., in coll. Sircoulomb; Genitalia prep. GS 14-048.

Phenotype (Plate 1A)
Forewing length: 9 mm, same size as a small male; female similar to male, excepted forewings more rounded and non-hyaline terminal area slightly larger; antennae filiform.

Genitalia (Plate 2A)
Papillae anales long; apophyses posteriores long, reaching sterigma; apophyses anteriores shorter; sterigma asymmetrical; posterior margin of lamella postvaginalis triangular and dentate; process flame shaped and medial; projection from right side of posterior margin oblique and sharp pointed; lamella antevaginalis with two stigmas in form of boomerang; corpus bursae oval; signum wide, star shaped, deeply toothed.

Comparative diagnosis (female genitalia)
The closest species is Zamarada anicta Prout, 1915 which mainly differs from Z. chrysothyra by having posterior margin of lamella postvaginalis dentate and rounded (not triangular), process less wide and projection from right side straight and rounded at apex (not oblique and sharp pointed).

Species-group
Z. chrysothyra is assigned to the group “pulverosa”. This group now contains 18 species, as two new Tanzanian species were described by Aarvik & Bjørnstadt (2007) (Z. musomae and Z. loleza).

B *Z. karischi* ♀: Korhogo-Koko, Ivory Coast.

C *Z. toulgoeti* ♀: Man, Mount Tonkoui, Ivory Coast.

D *Z. acalantis* ♂: Comoe, Zamou, Ivory Coast.

**PLATE 1** – *Zamarada* species: uppersides

**PLATE 2** - *Zamarada* species: female genitalia
Zamarada karischi Herbulot, 1998

Originally described from a male collected by Timm Karisch in the Ivory Coast, 5 km south of Nambonkaha (9°41’N, 5°11’W), on 30 August 1997, in an overgrazed wet savannah.

Examined material
1 ♀: Ivory Coast, Korhogo-Koko; 04°07’04.6”N, 07°35’04.5”W; 347 m; 21.vii.2014; Philippe Moretto leg., in coll. Sircoulomb; Genitalia prep. GS 14-078.

Phenotype (Plate 1B)
Forewing length: 13 mm; female similar to male; antennae filiform.

Genitalia (Plate 2B)
Papillae anales short; apophyses posteriores long, reaching sterigma; apophyses anteriores shorter, ending in form of club; sterigma  symmetrical, sclerotized in anterior; process in form of bowl, widely incised in middle; posterior margin softly serrate; corpus bursae long; signum star shaped, wide and flattened, deeply toothed.

Comparative diagnosis (female genitalia)
The closest species is Zamarada acosmeta Prout, 1921 which mainly differs from Z. karischi by having sterigma not sclerotized in anterior, process triangular in form of leaf deeply serrate (not bowl like).

Species-group
Z. karischi is assigned to the group “acosmeta”.

Zamarada toulgoeti Herbulot, 1979

Originally described from a male collected by Hervé de Toulgoët in Guinea, at Tondon (60 km North-West of Kindia), 8–14 December 1955.

Examined material
1 ♀: Ivory Coast, Man, Mount Tonkoui; 07°27’15.0”N, 03°46’07.0”W; 279 m; 13.ix.2014; UV light-trap in dry forest; Philippe Moretto leg., in coll. author. Other specimens: 1 female and 1 male (dissected, GS 14-97), same data.

Phenotype (Plate 1C)
Forewing length: 15 mm; female similar to male, excepted forewings more rounded; antennae shortly bipectinate; pectinations 1/2 shorter than those of males in the first half of antenna, 2/3 shorter in the second half.

Genitalia (Plate 2C)
Papillae anales long; apophyses posteriores long, reaching sterigma; apophyses anteriores shorter; sterigma symmetrical; process of lamella postvaginalis in form of crescent; corpus bursae long; signum circular, star shaped, toothed interior and exterior.

Comparative diagnosis (female genitalia)
The closest species is Zamarada triangularis Gaede, 1915: the female was recently described (Beck & Karisch, 2011) and mainly differs from Z. toulgoeti by having posterior margin of lamella postvaginalis straight and crenulate (not enlarged in form of crescent).

Figure 2 – Mount Tonkoui, Man, Ivory Coast.

Species-group
Z. toulgoeti is assigned to the group “triangularis”.

Zamarada acalantis Herbulot, 2001

Lastly, it is interesting to mention the collection of a second male of Z. acalantis (Plate 1D), a species described by Claude Herbulot, from a single male caught on 18 May 1970 in Ivory Coast, at Lamto, Bandama river bank, by Robert Vuattoux. The new specimen was determined by genitalia (prep. GS 15-012).

Examined material
1 ♂: Ivory Coast, Comoe, Zamou; 08°35’32.5”N, 03°46’07.0”W; 279 m; 13.ix.2014; UV light-trap in dry forest; Philippe Moretto leg., in coll. author.

Species-group
Z. acalantis is assigned to the group “protusa”.

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LITERATURE CITED


