



Studies on external genitalic attributes of two species of genus *Traminda* Saalmüller (Lepidoptera, Geometridae, Sterrhinae) from India

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ABSTRACT: Two species i.e., *mundissima* (Walker) and *aventiaria* (Guenee) belonging to genus *Traminda* Saalmüller of subfamily Sterrhinae have been collected from different localities of India. The external male and female genital structures are studied in detail and a key to the species is given. The diagnosis of genus *Traminda* Saalmüller along with first reference, type species and distribution is also mentioned.
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KEY WORDS: *Traminda mundissima* (Walker), *T. aventiaria* (Guenee), genitalic attributes, key

The genus *Traminda* Saalmüller is widely distributed throughout the old world tropics but more diverse in Africa, perhaps particularly associated with Savannah and other vegetation where there is a marked dry season (Holloway, 1997). Holloway (1997) not only recharacterized the genus by inclusion of external male and female genitalic attributes in its diagnosis but also suggested a new combination for one of the Indian species *T. aventiaria* Guenee. The present genus was erected on its type species *T. atroviridata* by Saalmüller in 1891. Warren studied many new species of this genus (1895, 1897, 1899). Likewise, Prout (1916, 1938) also described some new species under genus *Traminda* from different parts of the world including India. The genus is known by 22 species across the globe and out of which only two are reported from India (Scoble, 1999).

During the various collection-cum-survey tours

conducted in the Western Ghats of India, only two species i.e., *T. aventiaria* and *T. mundissima* Walker were collected and authentically identified with the help of relevant literature. Both these species were earlier discussed by Hampson (1895) under genus *Timandra* Duponchel. As discussed in the above paragraph, one of the present species has already been shifted by Holloway (1997) under the present genus; the other Indian species was also mentioned and studied under genus *Traminda* by Scoble (1999). Both these species have been described in detail in this manuscript.

The collection of adult Geometrid moths was made with the help of light traps fitted at different places during night time in different localities of Western Ghats of India. Collected and freshly killed specimens were pinned and stretched on stretching boards. Well stretched specimens were preserved in airtight fumigated wooden boxes. The method

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proposed by Common (1970) and advocated by Zimmerman (1978) were followed for the preparation of permanent slides of fore and hind wings. To study external male and female genitalic attributes, the entire abdomen was detached from insect body (Robinson, 1976). The detached abdomen was placed in 10 per cent KOH overnight to soften the chitin and for dissolving away the muscles and other unwanted parts. The abdomen was dissected in 50 per cent alcohol for taking out the male genitalia. After proper dehydration in different grades of alcohol, the genitalic structures were cleared in clove oil and then mounted in Canada balsam on cavity slides. The photography of external genitalic structures was done with the help of image processing unit in the department of Zoology, Punjabi University, Patiala. The terminology given by Klots (1970) has been followed in the study for nomenclature purpose.

Abbreviations:

1A : First anal vein; 2A : Second anal vein; 3A : Third anal vein; AED : Aedeagus, AMP : Ampulla; ANT.APO : Anterior apophyses; CO : Costa; CO.PR : Costal process; CRN : Cornuti; CRP.BU : Corpus bursae; CU : Cucullus; CU₁ : First cubital vein; CU₂ : Second cubital vein; DU.BU : Ductus bursae; DU.EJ : Ductus ejaculatorius; FUR : Furca; GN : Gnathos; HRP : Harpe; JX : Juxta; M₁ : First median vein; M₂ : Second median vein; M₃ : Third median vein; PAP.A : Papilla analis; PO.APO : Posterior apophyses; R₁ : First radial vein; R₂ : Second radial vein; R₂-R₅ : Stalk of R₂, R₃, R₄ and R₅ veins; R₃ : Third radial vein; R₃-R₅ : Stalk of R₃, R₄ and R₅ veins; R₄ : Fourth radial vein; R₄-R₅ : Stalk of R₄ and R₅ veins; R₅ : Fifth radial vein; Rs : Radial Sector; SA : Saccus; Sc : Subcosta; Sc+R₁ : Stalk of Sc + R₁; SIG : Signum; SL : Sacculus; SL.PR : Saccular projection; SO : Socii; TG : Tegumen; UN : Uncus; VES : Vesica; VIN : Vinculum; VLA : Valvula; VLV : Valva.

Genus *Traminda* Saalmüller

Saalmüller, 1891, *Lepid. Madagascar*, 2: 496.

Type species: *Timandra atroviridata* Saalmüller

Distribution: Old World tropics; Africa.

Diagnosis: Antennae of male bipectinated with the apex simple. Labial palpi porrect, directed upwards, reaching Up to frons and thickly scaled. Forewing with vein R₁ anastomoses with R₂-R₅ to form an areole; R₂-R₅ stalked from before upper angle; Cu₁ from close to lower angle of cell; Cu₂ from middle of cell. Hindwing with Sc+R₁ connected with cell at base; Rs and M₁ shortly stalked from upper angle of cell; M₃ and Cu₁ stalked from lower angle of cell. Hind tibiae dilated with a fold containing tuft of hairs and having two pair of spurs. Male genitalia with uncus strongly built; socii absent; gnathos reduced. Valvae simple, paddle like, narrow at base, broader and rounded towards apex. Aedeagus short, slightly sclerotized and narrow proximally, broader towards distal end; vesica not clearly differentiated. Female genitalia with corpus bursae oblong and membranous; signum absent; ductus bursae short and narrow.

Key to the studied species of genus

Traminda Saalmüller

1. Forewing with costa red and a grey centred ocellus at end of cell. Male genitalia with juxta simple and flap like..... *aventiaria* (Guenee)

- Forewing with costa not red and without grey centred ocellus at end of cell. Male genitalia with juxta well developed with two arms at its distal end..... *mundissima* (Walker)

Traminda aventiaria (Guenee) (Plate 1)

aventiaria Guenee, [1858], in Boisduval & Guenee, *Hist. nat. Insectes* (Spec. gen. Lepid), 10: 3.

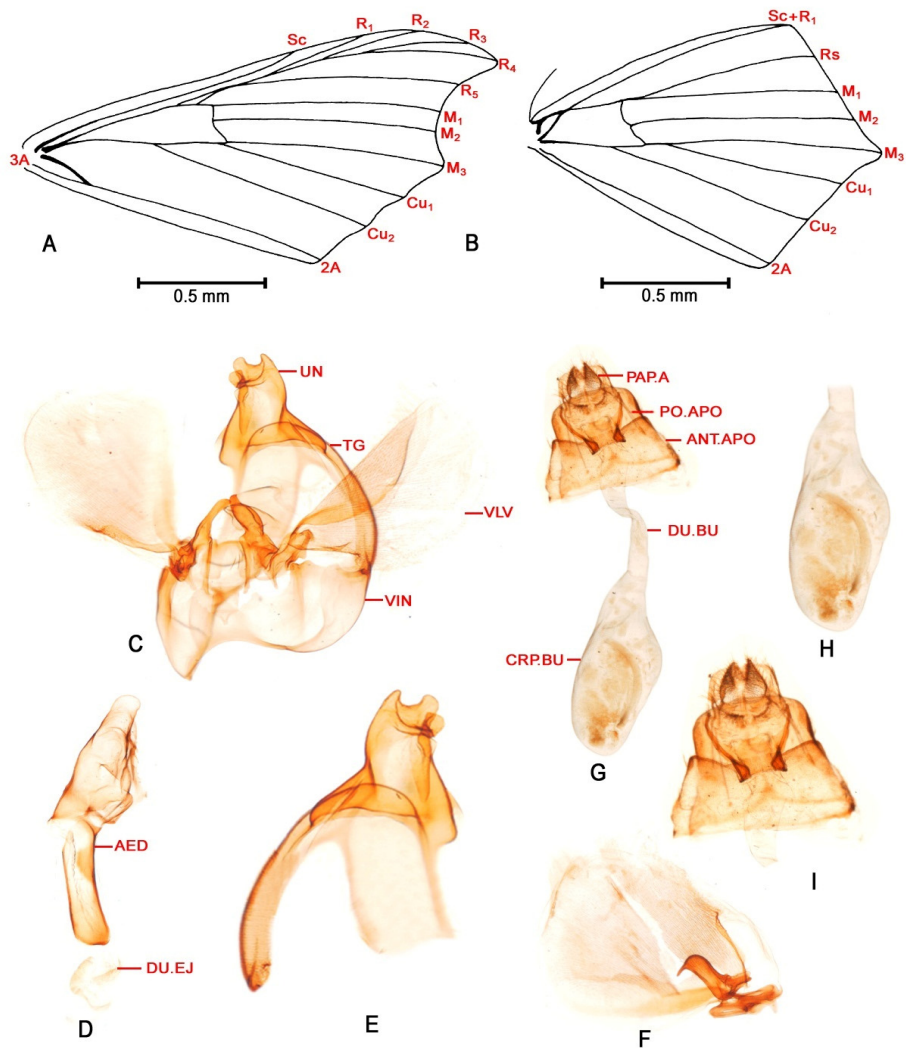
Timandra molybdias Meyrick, 1899, *Trans. ent. Soc. Lond.*, 1899: 488.

External male genitalia (Plate 1, Figs. C, D, E, F): Male genitalia with uncus strongly built, well sclerotized, broad at base, bilobed apically with subapical projection; socii absent; gnathos reduced; tegumen broad, longer than uncus, inverted v-shaped; vinculum shorter than tegumen, slightly sclerotized, w-shaped; saccus wanting. Valvae simple, paddle like, narrow at base, broader and rounded towards apex, sparsely setosed with setae; strong, sclerotized saccular projection, with pointed

PLATE- 01



Traminda aventiaria (Guenee)

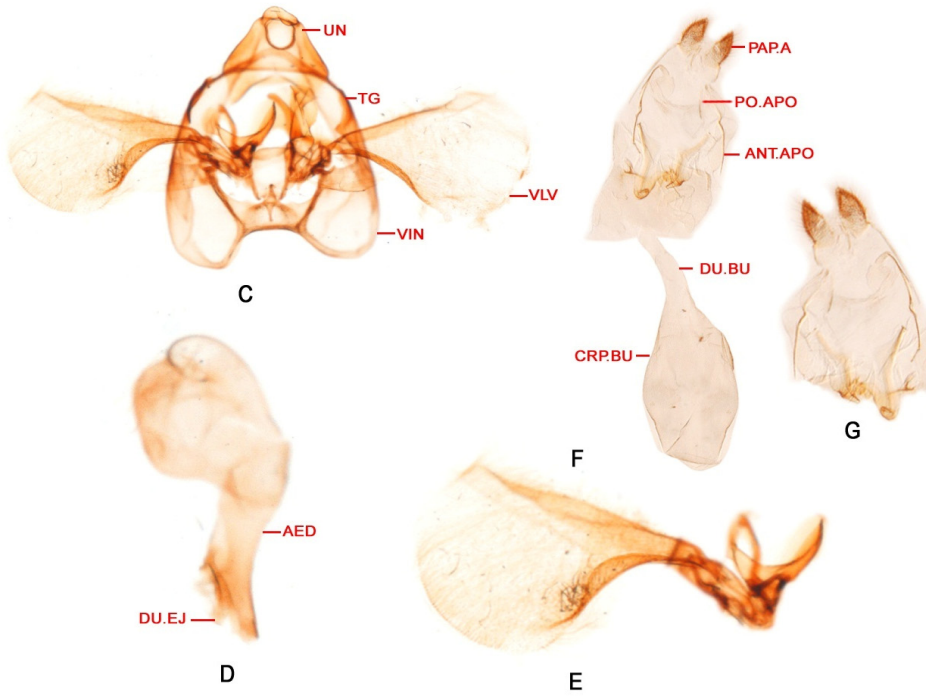
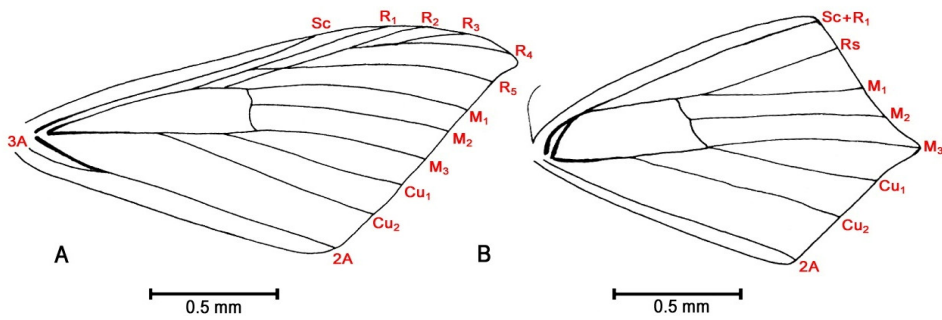


A. Forewing, B. Hindwing, C. Male genitalia, D. Aedeagus,
 E. Uncus with Tegumen (Lateral view), F. Valva (Left),
 G. Female genitalia, H. Corpus bursae (Enlarged),
 I. Papilla analis with Apophyses (Enlarged)

PLATE- 02



Traminda mundissima (Walker)



A. Forewing, B. Hindwing, C. Male genitalia, D. Aedeagus, E. Valva (Left), F. Female genitalia, G. Papilla analis with Apophyses (Enlarged)

tip. Transtilla membranous; juxta simple, flap like. Aedeagus short, slightly sclerotized and narrow proximally, broader towards distal end; vesica not clearly differentiated; ductus ejaculatorius entering subapically.

External female genitalia (Plate 1, Figs. G, H, I): Female genitalia with corpus bursae oblong, membranous, slightly sclerotized at base; signum absent; ductus bursae short, narrow, membranous; ostium bursae well developed, sclerotized; posterior apophyses slightly longer than anterior apophyses; papilla analis well developed, triangular sparsely setosed with few setae.

Wing expanse (Full): Both sexes 36 mm.

Material examined

Karnataka : Dandeli, 16.ix.07-2♂♂,
1♀; 26.x.09- 1♀.

Maharashtra : Panala, 7.ix.07- 1♂.

Old distribution: Formosa; throughout India, Sri Lanka and Myanmar; Java; Australia.

Remarks: Holloway (1997) in his publication 'Moths of Borneo' gave the diagnosis, geographical range and some notes on the biology of species *aventiaria* Guenee and also suggested a new combination for it. Although he gave the photographs of external male and female genitalic structures in his publication he could not describe various genitalic attributes in detail. The genitalic structures of the present species are described and illustrated in detail in the present manuscript.

***Traminda mundissima* (Walker) (Plate 2)**

mundissima Walker, 1861, *List. Specimens lepid. Insects Colln Br. Mus.*, **23**: 795.

External male genitalia (Plate 2, Figs. C, D, E): Male genitalia with uncus well developed, sclerotized, broad at base, narrow towards apex with subapical hood; socii absent; gnathos reduced; tegumen longer than uncus, sclerotized, inverted v-shaped; vinculum as long as tegumen, w-shaped; saccus wanting. Valvae simple, paddle like, narrow

at base, broader and rounded towards apex; well sclerotized, strong saccular projections rising from the base. Transtilla well developed; juxta well developed, with two arms at distal end. Aedeagus short, hammer like, narrow proximally, broader towards distal end; vesica not clearly differentiated; ductus ejaculatorius entering laterally.

External female genitalia (Plate 2, Figs. F, G): Female genitalia with corpus bursae oval, membranous; signum absent; ductus bursae short, narrow, tubular, membranous; posterior apophyses longer than anterior apophyses; ostium bursae weakly sclerotized; papilla analis triangular, slightly sclerotized, beset with micro and macro setae.

Wing expanse (Full): Both sexes 26 mm.

Material examined

Gujarat : Waghai, 31.viii.07- 1♀;
1.ix.07- 1♂, 1♀.

Maharashtra : Malshej Ghat, 3.ix.07- 1♀.

Karnataka : Dandeli, 26.x.09- 1♂.

Old distribution: Abyssinia; throughout India, Sri Lanka and Myanmar; Australia.

Remarks: The genitalic features of the present species strictly conform to the characterization of the type species of genus *Traminda* Saalmüller. The species is described and illustrated here in detail for the first time.

ACKNOWLEDGEMENT

The authors are thankful to Dr. Devinder Singh, Head, Department of Zoology, Punjabi University, Patiala, Punjab for providing necessary laboratory facilities.

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(Received September 23, 2022; revised ms accepted January 03, 2023; published March 31, 2023)