



## Sex determination of home invading nuisance beetles, *Mesomorphus villiger* Blanchard and *Luprops tristis* Fabricius (Coleoptera: Tenebrionidae) based on pupal morphology

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**ABSTRACT:** A methodology based on pupal morphology for sexing two darkling beetles, *Mesomorphus villiger* and *Luprops tristis* is described. With this methodology, sexing of teneral adults is possible and is safer than the crude sternal notch methodology that involves forceful extrusion of genitalia of adults which often lead to the death of beetles.

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**KEY WORDS:** Darkling beetles, pupa, sexing, *Mesomorphus villiger*, *Luprops tristis*, Tenebrionidae

Home invasion followed by formation of huge aggregation in residential buildings with the onset of monsoon season, nocturnal movements, prolonged inactivity in dormant state to tide over the rainy season, release of an irritating, odoriferous quinonic secretion that causes mild skin burns make the two darkling beetle species *Mesomorphus villiger* Blanchard 1853 and *Luprops tristis* Fabricius 1801, (Coleoptera: Tenebrionidae) serious nuisance pests in many regions of south India (Seená and Sabu, 2013 and Abitha *et al.*, 2010).

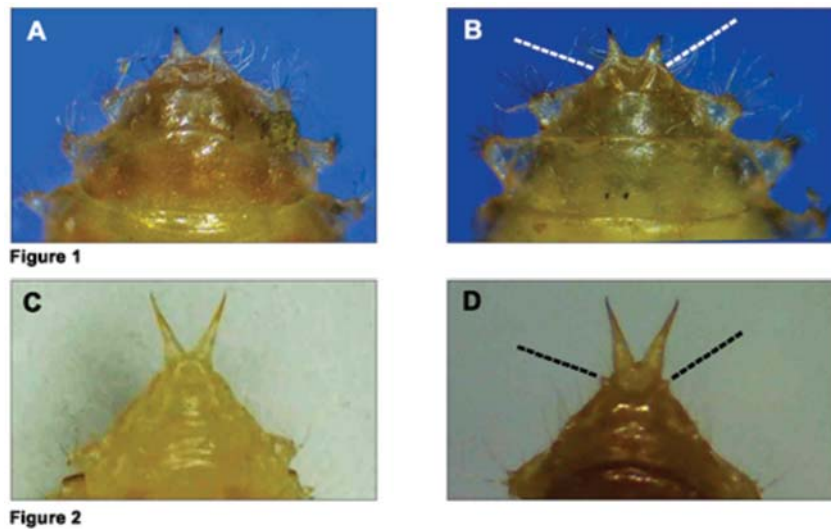
Sexing of live adults of *M. villiger* and *L. tristis* for experimental studies are done following the sternal notch methodology (Vinod *et al.*, 2008 and Arunraj and Sabu, 2012) which involves forceful extrusion of genitalia of adult. However, this crude method often affects the growth and survival of the beetles (personal observations) and not useful for sexing teneral adults. Search for alternate methods revealed that pupal morphological features used for sexing *Tenebrio molitor* (Bhattacharya *et al.*, 1970), *Alphitobius diaperinus* (Esquivel *et al.*, 2012) and wax blooming beetles *Colposcelis*

*microderoides microderoides* and *Anatolica politaborealis* (Wang *et al.*, 2013) could be used for sexing in *M. villiger* and *L. tristis*.

Pupae were obtained from field collections and from colonies maintained under laboratory conditions. Pupae were examined under a stereo zoom microscope (Labomed CZ 70; Labomed India Ltd, <http://www.labomed.in>) with the ventral surface facing up, to identify the differences. Sexed pupae were divided into two groups according to the morphological differences of the 8<sup>th</sup> abdominal sternite and were allowed to develop to the teneral adult stage. Confirmation of sexing was carried out by inspection of the adult genitalia with the sternal notch methodology.

Male and female pupae of *M. villiger* and *L. tristis* could be conclusively distinguished based on the morphological differences of the ventral region of the 8<sup>th</sup> abdominal sternite. A pair of prominent papillae is present on the 8<sup>th</sup> abdominal sternites in female pupae of both *M. villiger* and *L. tristis*, whereas male pupae are without similar structures

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**Fig. 1.** Abdominal sternite VIII of *Mesomorpha villiger* : (A) male pupa without and (B) female pupa with paired pygopods; **Fig. 2.** Abdominal sternites VIII of *Luprops tristis*: (C) male pupa without and (D) female pupa with paired pygopods

(Figure 1&2). These prominent papillae are the paired pygopods. This is the simplest and least destructive method for sex differentiation of both *M.villiger* and *L.tristis*. However, univoltinism and the seasonality of pupal stage of both pest species with their occurrence confined to the pre summer periods (Sabu *et al.*, 2008) make sexing based on pupal morphology difficult during other seasons and is a limitation of this methodology. During other periods, sexing of adults based on sternal notch methodology is the only option.

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