

Redescription of *Acroclita vigescens* Meyrick (Tortricidae: Lepidoptera) feeding on *Cordia myxa* Linnaeus (Boraginaceae) in India

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Abstract

The early stages (egg, larva, and pupae) and adult morphology of *Acroclita vigescens* Meyrick (1920) (Tortricidae: Olethreutinae: Eucosmini) are described and illustrated, along with the first description and illustration of the male genitalia. The species was discovered feeding on *Cordia myxa* Linnaeus (Boraginaceae) in New Delhi, India.

Keywords: Egg, Eucosmini, Larvae, Male Genitalia, Pupae

Introduction

The tortricid tribe Eucosmini (Tortricidae: Olethreutinae) is represented by more than 1,989 species in 134 genera world over (Gilligan *et al.*, 2018). Within Eucosmini, the genus *Acroclita* Lederer (1859) includes 40 species occurring in South America, Africa, Asia, and Australia, with greatest diversity in the Oriental region (Gilligan *et al.*, 2018), while from India only 9 species are known (Pathania *et al.*, 2020). In an observation where larvae found feeding on *Cordia myxa* (Boraginaceae) in New Delhi, India, produced adults and that were identified as *A. vigescens* Meyrick (1920) based on adult morphology. The present study deals with the early stages (egg, larva, and pupa) and adult of this species, along with details and illustrations of the damage to the host plant. The details of morphology of the adult (including antenna, position of chaetostomata, legs, wing venation), and male and female genitalic characters has also been provided, including description of the male genitalia for the first time.

Material and Methods

The present study was conducted at the Indian Agricultural Research Institute, New Delhi, during 2010-

2015. Eggs were collected in the field from *C. myxa* and reared under laboratory conditions. Samples of all life stages were preserved for morphological studies. Voucher specimens are deposited at the National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India. Larvae were collected and relaxed in warm water and preserved in 70% ethanol. The larvae were boiled in 10% KOH for 1 hr at 90°C, and afterwards cleared and slide mounted in glycerol (Hinton, 1946; Peterson, 1962). For the study of genitalia, abdomens were removed and boiled in 10% KOH for 20 min. at 90°C in dry block (Kumar & Ramamurthy, 2010). Heizgerät-28000 then transferred to glacial acetic acid for 5 min for cleaning and processed using standard procedures described by Holloway and Bradley (1987), and then stored in ethanol. Photographs were taken with a Leica DFC-290 camera mounted on a Leica MZ16A microscope using software Leica Application Suite. Comstock & Needham (1898-99) and Kallies (2004) were followed for terminology. Illustrations were made by using a drawing tube attached to a Nikon SMZ10 stereo zoom microscope. The final plates were prepared using Adobe Photoshop Elements 2.0. For field photography a Sony DSC R1 10.3 megapixel camera was used.

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Results

Acroclita Lederer, 1859.

1859. *Acroclita* Lederer, *Wien. Ent. Monatschr.*, 3: 123, 329.
 1908. *Acrolita* [sic!] Fernald, *Genera Tortricidae Types*: 59.
 1946. *Acrolita* [sic!] Turner, *Trans. R. Soc. N.S.W.*, 70: 197.

Type-species: Paedisca arctana Staudinger, 1859, *Ent. Zig. Stettin.*, 20: 232, by subsequent monotype.

Adults: Adults of *Acroclita* are the species difficult to distinguish from the other genera. In male the outer margin of the forewing and hindwing are light grey, while in female forewing is grey black and hindwing dark grey. The wing expanse is 8-10 mm in the male and 9-12 mm in female. The newly emerged adults are very active.

Distribution: Oriental, Australian, African, Palearctic and Neotropical regions.

Acroclita vigescens Meyrick, 1920

1920. *Acroclita vigescens* Meyrick, *Exotic Microlepidoptera*, 2: 343.

(Type-locality: Surat, Bardoli)

Egg: The eggs are laid down on the underside of the leaves in a group of 5-8 eggs. They are light yellow in colour.

Larva: (Figure 4-7) Body cylindrical, Head brownish yellow, thorax blackish brown, and abdomen creamy white. The larva feed on the epidermis of leaves, forming a dark brown tortuous line, which ultimately spreads on the entire leaf surface, devoiding the leaf of its chlorophyll content. The larva after 10-15 days emerges out from the mine and spins a white shining web on the surface of leaf for pupation.

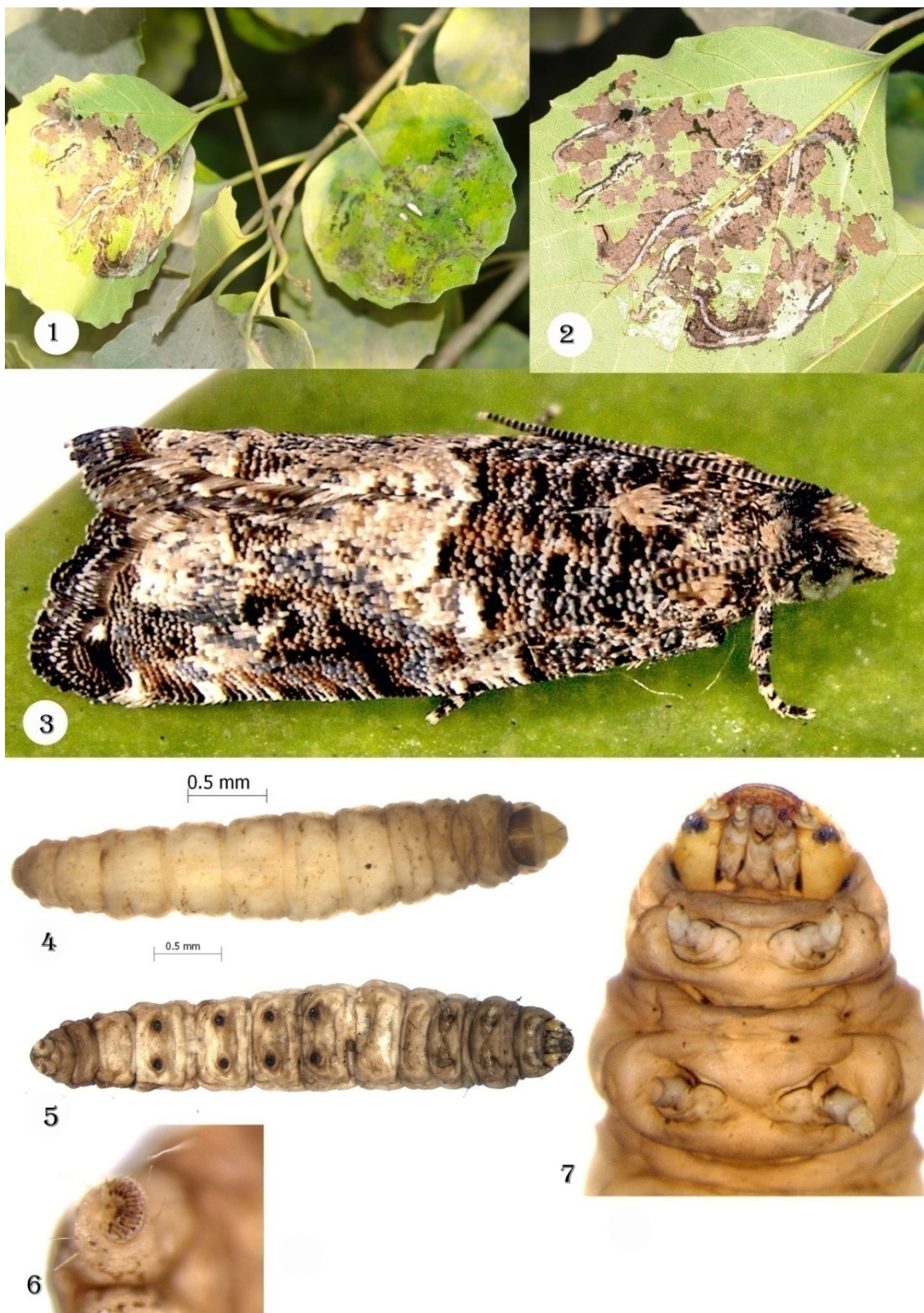
Pupa: (Figure 8-19) Cocoons are constructed on upper side of leaves, and are pure white with faeces along with tunnels where feeding done, elongate. Male and female pupae are brown. Male pupae have a short abdomen and the male genital scar is present on the 9th sternum. Female pupae are larger than male pupae. 8th and 9th sternum are fused and a female genital pore is present on the fused sternum. The anus is present on the 10th sternum in both male and female pupa. Dark brown small spine row is present on abdominal segments dorsal side of both pupae.

Diagnostic features – Adults: (Figure 20-21) Wing expanse 25-30 mm. Vertex covered with blackish and grayish scales;

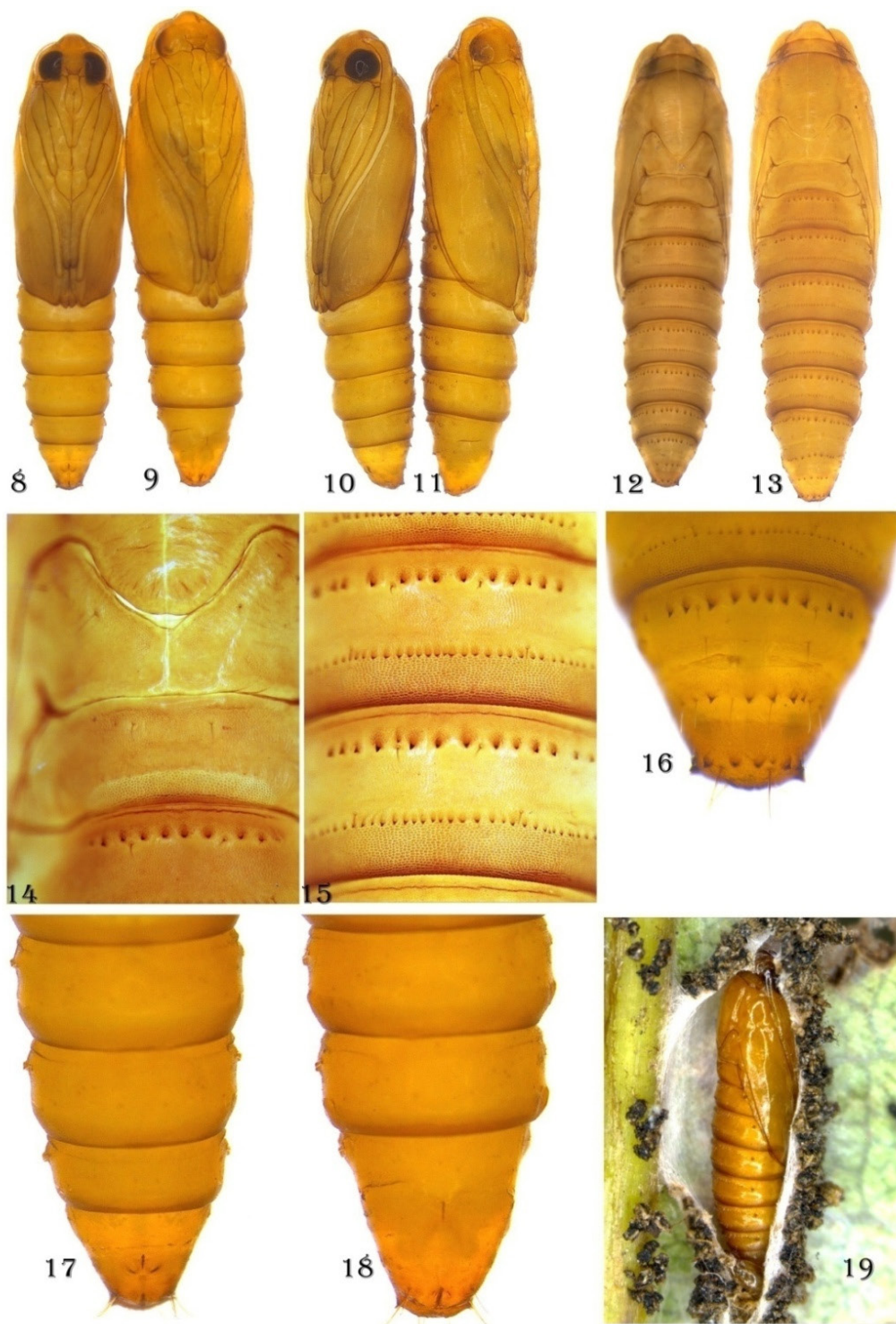
frons decorated with fuscous, antennae filiform (Figure 33-34), long, creamish and black, labial palpus moderate, two times diameter of eye, second segment with a mixture of creamish and black scales, slightly upcurved, expanded terminally with scales on upper and lower side, third segment minute, decorated with whitish scales, slightly drooping (Figure 26-29); thorax greyish, wings costa slightly arched, apex pointed, termen oblique, moderately concave till middle, tornus obtuse, anal margin straight, covered with greyish brown, mixed with light fuscous scales, basal portion of the wing from costal margin to anal margin black, half-moon shaped black at the middle of costal margin, apex black, tornus and cilia with creamish and black, costal strigulae creamish black in colour; hindwing quadrate, semi-hyaline, greyish, dark grey scales along the veins and margins, margins and fringes dark grey; legs shining with creamy and black (Figure 30-32).

Wing venation: (Figure 22-25) Forewing with Sc ending before middle of costa, R_1 arising at middle of discal cell, R_2 and R_3 are straight and parallel, R_3 very near upper angle of cell, R_4 and R_5 stalked, stalk extending up to middle, R_5 ending at termen, R_4 arising from upper angle of cell, M_1 straight, arising at middle of discal cell, M_2 free, M_3 arising at the middle of the discal cell and formed a forked vein with CuA_1 , CuA_2 arising from 2/3 of the cell, free, CuP not visible, $1A+2A$ forked at base, fork extending up to 3/4, discal cell long and narrow, chorda present, arising in the middle of R_1 and R_2 , ending in the middle of R_3+R_4 and M_1 , M-stem arising in between Sc and R_1 , nearer to R_1 , ending at M_3 ; hindwing with $Sc+R_1$ ending at half of costa, Rs and M_1 closely stalked, M_1 to termen, M_2 present, reached at middle of termen, M_3 and CuA_1 stalked at lower angle of cell, CuA_2 arising from middle of the cell, free, CuP absent, $1A+2A$ forked at base.

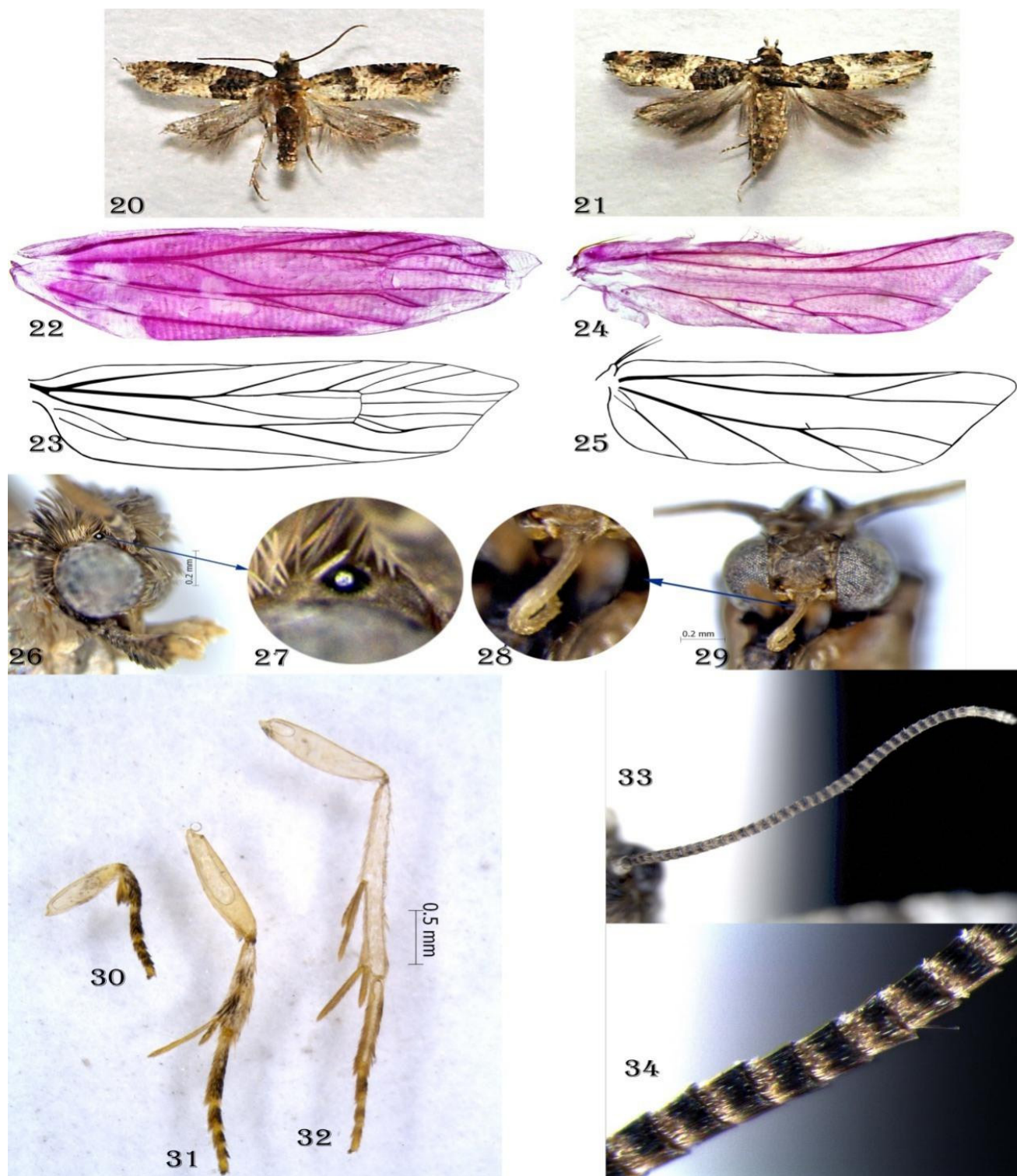
Male genitalia: (Figure 35-36) Uncus bipartite, tips pointing laterally, sparsely setose; socii present, decorated with long fine hairs; tegumen long, broader at middle; vinculum V-shaped, saccus absent; valva leaf-like, basally narrowed, broader apically with long hairs, costal margin basally straight, concave at middle, cucullus apically rounded, broader basally, decorated with long hairs and strong setae; saccus margin concave basally and convex at middle; aedeagus small, shorter than valva, vesica without cornuti.



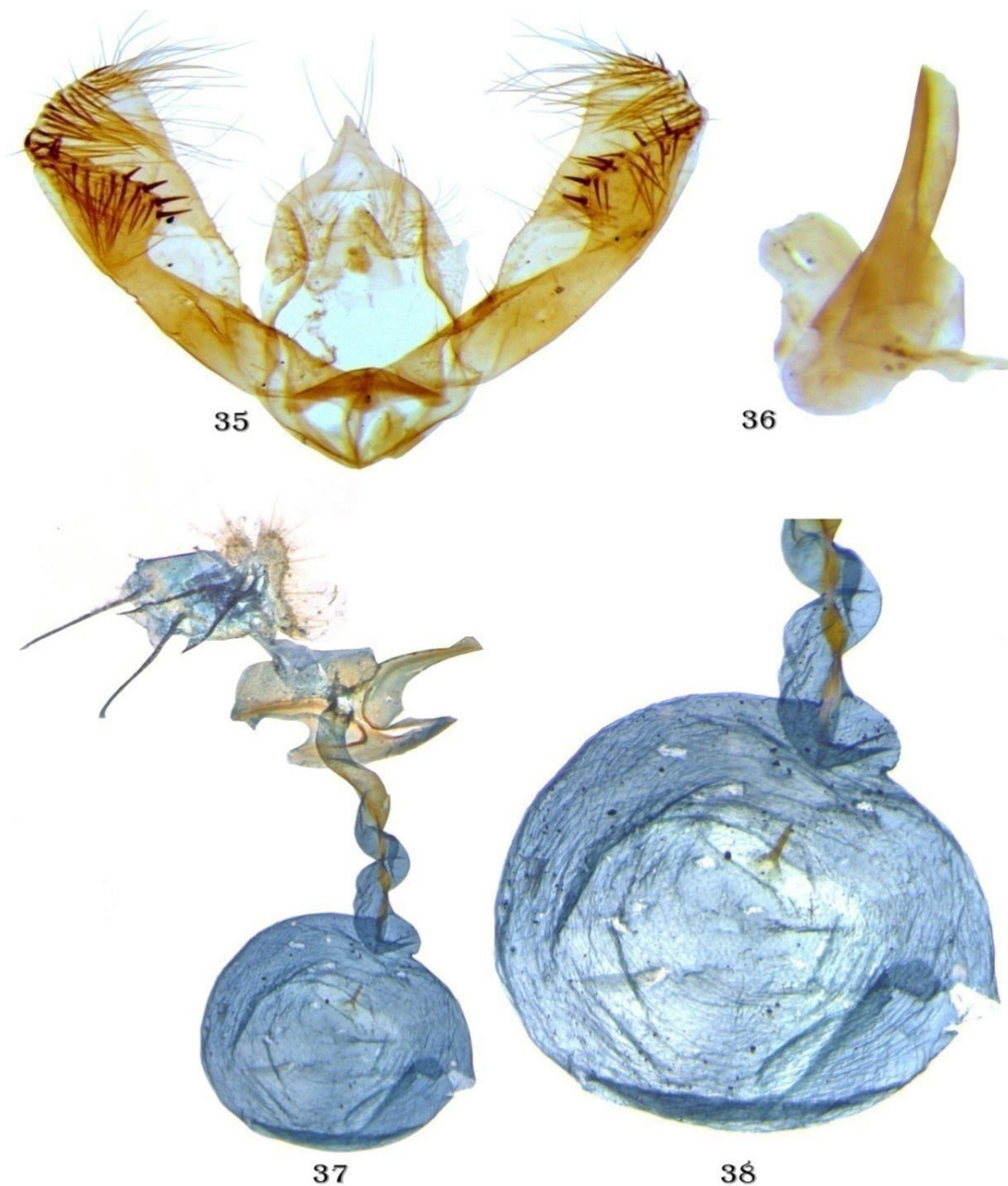
Figures 1–7. Damage symptoms of *Acroclita vigescens* Meyrick. 1-2. Larvae feeding in tunnels on leaves of *Cordia myxa*; 3. Adult sitting on leaf; 4. Dorsal view of larva; 5. Ventral view of larva; 6. Anal leg of larva; and 7. Dorsal view of mouth parts of larva.



Figures 8–19. Pupae of *Acroclita vigescens* Meyrick. **8.** Ventral view of male, **9.** Ventral view of female; **10.** Lateral view of male pupa, **11.** Lateral view of female pupa, **12.** Dorsal view of male pupa, **13.** Dorsal view of female pupa, **14.** Enlarged view to show dents on dorsal side of both the male pupae, **15.** Enlarged view to show dents on dorsal side of both the female pupae, **16.** Last segment of pupa, **17.** Male genital pore of pupa, **18.** Female genital pore of pupa, **19.** Pupa in cocoon.



Figures 20–34. Adult morphology of *Acroclita vigescens* Meyrick. 20. Male habitus photos, 21. Female habitus photo, 22. Forewing venation photo, 23. Forewing venation line diagram, 24. Hindwing venation photo, 25. Hindwing venation line diagram, 26. Lateral view of mouth part, 27. Chaetosemata, 28. Proboscis, 29. Frontal view of mouth part, 30. Fore leg with epiphysis, 31. Mid leg with 2 tibial spurs, 32. Hind leg with 4 tibial spurs, 33. Antenna, 34. Enlarged view of antennal segments.



Figures 35-38. External genitalia of *Acroclita vigescens* Meyrick. **35.** Male genitalia, **36.** Aedeagus, **37.** Female genitalia, **38.** Enlarged view of corpus bursae showing signum.

Female genitalia: (Figure 37-38) Papillae anales large, somewhat slender, heavily setose, anterior apophyses slightly long, sclerotized, longer than posteriorapophyses; ostium bursae broad, open at centre; ductus bursae long, slightly coiled and proximal half slightly sclerotized; corpus bursae large, globular in shape, less sclerotized,

signum present, Y-shaped, ductus seminalis enter at the end of sclerotized region.

Material examined: 30 pupae, IARI, New Delhi, 10. viii. 2009; 30 larvae, Entomology Division, Indian Agricultural Research Institute, New Delhi, 13. vii. 2009, coll. Rajesh

Kumar; 10♂, emerged in laboratory, Entomology Division, IARI, New Delhi, 23. xi. 2008, coll. Rajesh Kumar, 15♀ emerged in laboratory, Entomology Division, IARI, New Delhi, 25. xi. 2009, coll. Rajesh Kumar.

Hostplants: Cordia trifolia, Cordia myxa (Boraginaceae) (Meyrick, 1920; Diakonoff, 1982).

Distribution: India: Delhi (present study), Bihar Gujarat, Maharashtra, West Bengal, Mumbai; Sri Lanka: Wilpattu (Pathania *et al.*, 2020).

Discussion

The present study deals with the reporting of the species, *Acroclita vigescens* Meyrick, for the first time from our

national capital, New Delhi, India. Their larvae found feeding on *Cordia myxa* Linn. (Boraginaceae) at the area under reference, produced adults and were identified as *A. vigescens* Meyrick, based on adult morphology. The different life stages and morphological characters of this species is described and illustrated in detail. Beside this the importance of its description and illustration of the male genitalia is also highlighted for the first time, while the female genitalia were described long back in Clarke (1958). The species is reported for the first time from New Delhi, India.

Acknowledgement

The authors are thankful to the Director, Zoological Survey of India, Kolkata, for work facilities and permission.

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