



## First record of *Carbula scutellata* Distant 1887 (Hemiptera: Pentatomidae) from Assam and a new record of its association with *Acalypha indica* (L.) plant

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### Abstract

This is the first report of the presence of *Carbula scutellata* Distant from Guwahati, Assam and also it reports for the first time the association of this bug with a host plant *Acalypha indica*, a weed. Information on the detailed taxonomic description and microscopic images of its important body parts are provided to assist with the identification of this bug.

**Keywords:** *Carbula scutellata*, Pentatomidae, *Acalypha indica*, Guwahati

### Introduction

*Carbula scutellata* (Distant 1887) is a member of Pentatomidae family belonging to the tribe Eysarcorini. The genus *Carbula* is represented by 76 species from the world with 11 species from India<sup>1-6</sup>. Of these, only one has been reported from North Khasi Hills<sup>2</sup> (present day Meghalaya) and others are reported from rest of the India<sup>[1-11]</sup>. But no such record has been reported from Guwahati (Assam), so far. This is the first report of *C. scutellata* from present-day Assam, though the presence of *C. scutellata* in Khasi hills, which was once a part of undivided Assam<sup>[12]</sup>, was reported earlier by Distant<sup>3</sup>.

Literature report on the host plants of *C. scutellata* is severely lacking. This is the first report of *Acalypha indica* (L.) as the host plant of *C. scutellata*. *A. indica* is a herbaceous plant belonging to the family Euphorbiaceae and is commonly known as Indian-nettle. It has catkin inflorescences. It grows in a generally disturbed areas like waste lands, roadsides and crevices in walls. Though this plant has been reported to be the host of spiralling whitefly and papaya mealybug<sup>13,14,15</sup> but it has not been reported to be associated with *C. scutellata* so far.

### Materials and methods

#### Study area

Cotton University is situated at the heart of the Guwahati City (Figure 1) covering an area of approx. 34 acres on the south bank of River Brahmaputra. The temperature of this region ranges from 32- 36°C during summer and 20-25°C during winter. Humidity ranges from 74-88% during summer and 60-70% during winter. The university campus has sparse vegetation along with some trees.

### Collection

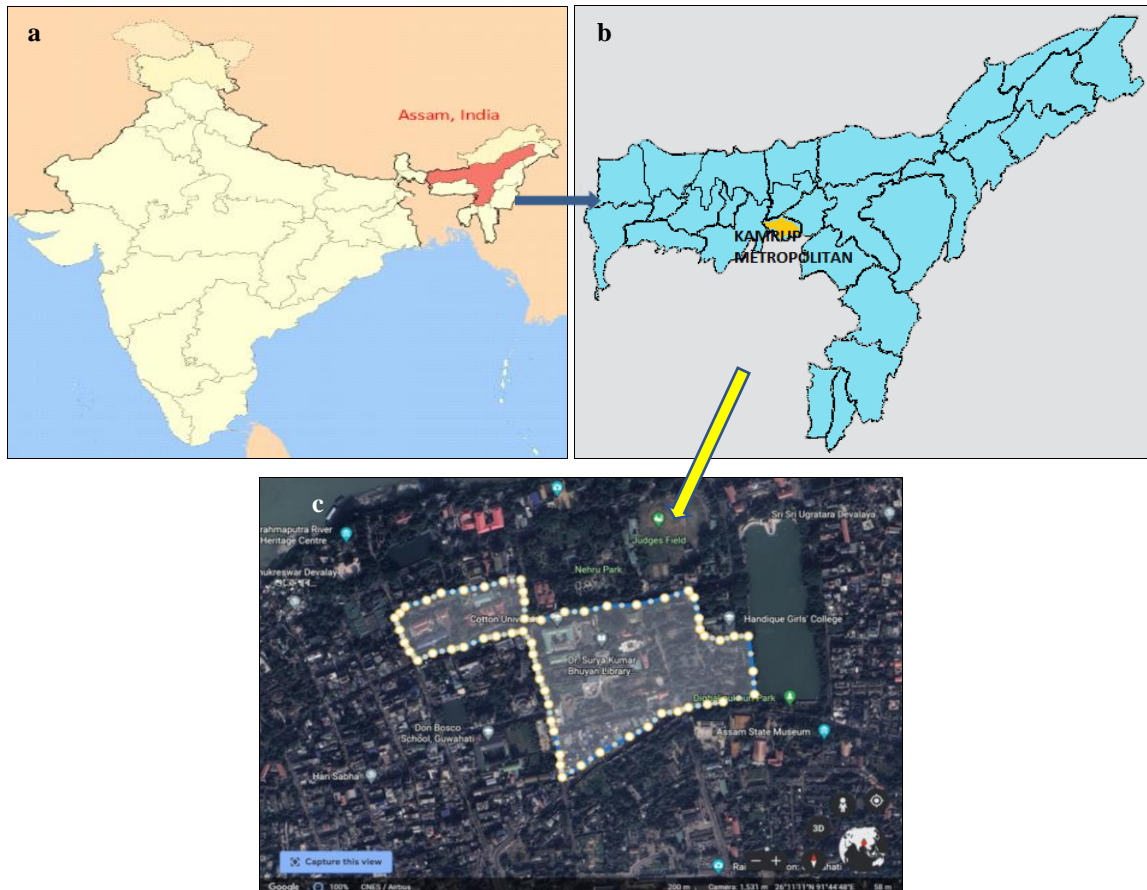
On a routine survey of the university campus, we first spotted *C. scutellata* on *A. indica* plant in July, 2016. Adult bugs were collected by hand, kept in a plastic container, then killed using ethyl acetate, and later pinned, stretched and dried in an oven at 35-40°C for an hour to avoid fungal infection. The remaining bugs were used to prepare slides of their body parts and were observed under the microscope.

### Identification

Bugs were observed under the Stereozoom microscope (Magnus, 2X to 4X) and identified by observing morphological characteristics using available keys and books<sup>3</sup>.

### Morphometry

All the measurements were taken in millimetres (mm) with a handheld micrometre and presented as median values with minimum and maximum values. The following dimensions were measured- total body length (from the apex of the mandibular plate to the apex of the last abdominal tergite excluding wing membrane), head length (from the apex of the mandibular plate to the anterior margin of the pronotum), head width (head width including the eyes), total length of the antennae, total length of labium, pronotum length medially (from anterior to posterior margin of pronotum), pronotum width (between two humeral angle of the pronotum), scutellum length (medially from posterior margin of the pronotum to the apex of the scutellum), scutellum width (maximum width at base between basal angles of scutellum), total lengths of – foreleg, midleg and hindleg<sup>[16]</sup>.



**Fig 1a:** Map of India (Source: [https://pepperhead.com/wp-content/uploads/Assam\\_India.png](https://pepperhead.com/wp-content/uploads/Assam_India.png))  
**b.** Map of Assam (Source: [https://www.veethi.com/images/maps/districts/assam/kamrup\\_metropolitan\\_district\\_map.png](https://www.veethi.com/images/maps/districts/assam/kamrup_metropolitan_district_map.png))  
**c.** Satellite image of Cotton University Campus (Source: Google Earth)

### Photography

Images of the insects were taken with a smartphone (Samsung, M 51, 64 MP) under the Stereo-zoom microscope (Magnüs, 2X to 4X) and were edited using Adobe Photoshop 2022.

### Preservation

Dried insects were pinned, labelled and kept in a wooden box of size (37cm X 30cm X 7 cm) with naphthalene balls. Voucher specimens of this species are preserved in 70% alcohol in the Department of Zoology, Cotton University, Assam.

### Observations

The adults of *C. scutellata* were spotted first time from the leaves and inflorescence of *A. indica* growing in wild, during a casual survey for insect pests in the Cotton University Campus, Guwahati in July 2016. The bugs were collected and were dry preserved. To confirm the association of this bug with *A. indica* survey was continued in the subsequent years. All sorts of wild grasses were cleared off from the survey area in 2017 by the authorities due to the construction work; so no bug was found in that year. When the wild vegetation of the campus started to grow again in the subsequent year, a survey was done again from July 2018 to Dec. 2018 to collect more bugs so that a detailed examination can be done. This bug was always found associated with this plant. Eggs were found deposited on young leaves and different nymphal stages were also seen on the plant.

### Materials Examined

*Carbula scutellata*, Dist. Tr. E. S. 1887, 10 ♂, 10 ♀, India: Assam, Dist. Kamrup (Metropolitan), Guwahati, 12.vii.2016, Anjana Singha Naorem (Lat.: 26°11'5'', Long.: 91°45'5'').

### Measurements (range in mm)

Total body length 7-8.2; head length 1.7-2; head width 1.5-1.7; total length of antennae 4-5; total length of labium 3.5-4; pronotum length 2-2.2; pronotum width 6-7; scutellum length 2.5-2.9; scutellum width 2.6-3; length of foreleg 4.8-5; length of midleg 5.1-5.3; length of hindleg 6.8-7.

### Diagnostic characters (Figure 2 (1-d))

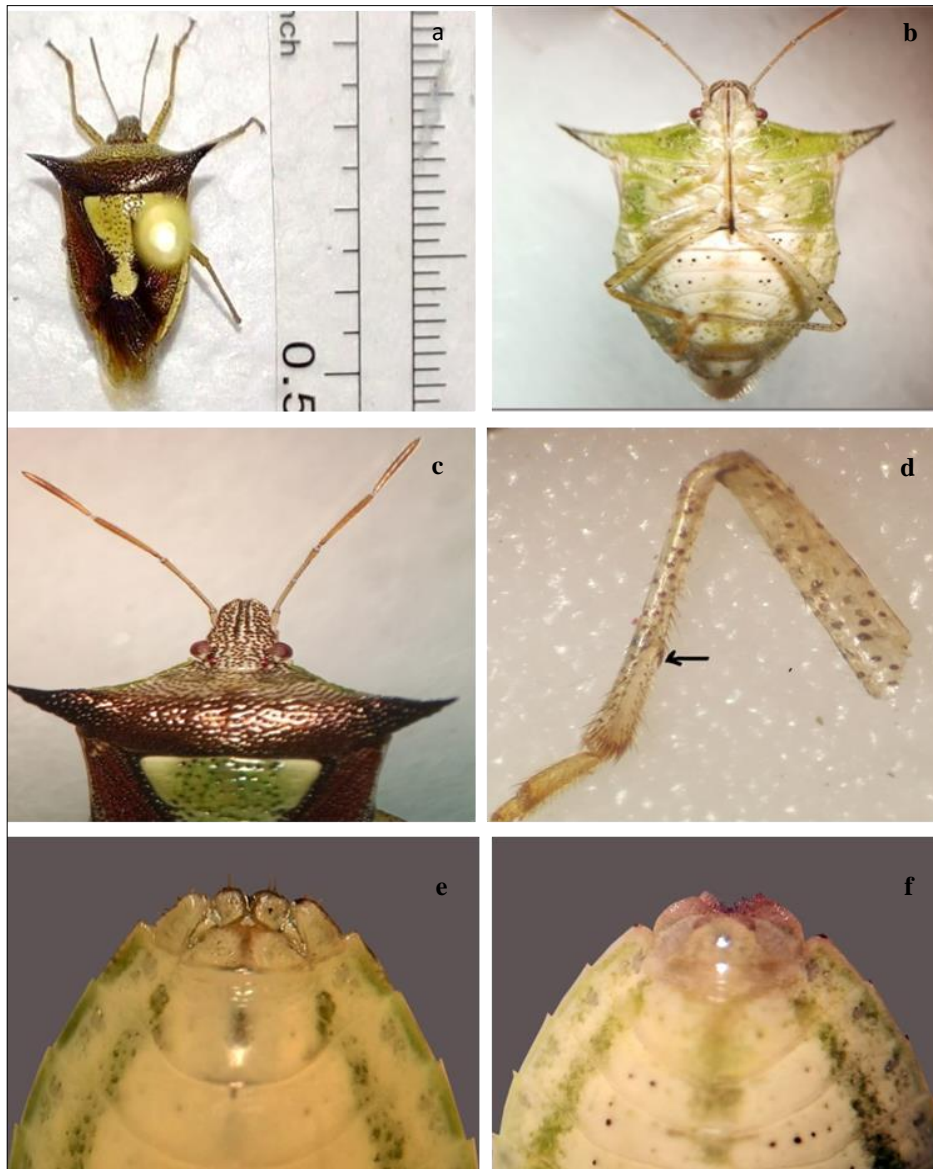
Dorsal body colour is largely fuscous except the anterior portion of the pronotum and scutellum (Figure 2a). Body is coarsely brownly punctate. **Head:** Head narrow, elongate, longer than wide; lobes rounded at the apex; eyes fuscous, ocelli red; intraocular length is lesser than the length of the head. Antennae is five segmented (I<II=III<IV=V), first three antennal segments are ochraceous, segment IV infuscated at the apex and segment V light brown in colour. Jugal sub-equal in length to tylus. Labium with segment II longest, segment I longer than segments III and IV, segment III and IV subequal (Figure 2b). **Thorax:** Anterolateral margins of pronotum light green in colour, pronotum width is almost three times as wide as long, strongly declivent; posterolateral angles acutely produced into black spines (Figure 2c); lateral margins entire, reflexed; posterior

margin straight; darkly and deeply punctate; pronotal callus is present very close to the anterior margin. The margins and apices of the undersurface of the pronotal spines are dark. Scutellum is light green in colour in the central disk region and at the area near basal angles and the apex it becomes pale giving a white appearance in most cases; it is as long as wide at the base, sparingly and darkly punctate only at the middle portion and on the two lateral margins; impunctate at the three apex regions. Scutellum gradually narrowed towards the apex and rounded and distinctly extends beyond the middle of the abdomen. Legs ochraceous: femur and tibia spotted in brown. Femur is thicker than tibial segment; tibial distal end has thicker and more densely placed spines as compared to its proximal part and to the femur region; tibia of forelegs bear a stout spine nearly at the basal 1/3<sup>rd</sup> of the length of the tibia (Figure 2d) which has not been reported earlier in any of the *Carbula* species; 3-segmented tarsus; first tarsomere longer than the other two. This species closely resembles *Carbula socia* in having humeral angles of the pronotum prominent. Corium usually has a tinge of purple; anterior as well as the posterior angle of the corium are blunt; membrane pale hyaline with veins light or dark brown; connexivum pale greenish with black spots on

posterior margins. *Abdomen*: Abdomen is completely covered with wings. Ventral side of the body is pale green in colour and slightly convex in middle, abdominal sternites with dark scattered spots and prominent black spots at the lateral posterior angle. At the posterior margin of the abdominal sternites, rows of hairs are present in both males and females, but the pattern of hairs is different in both the cases.

#### Variability (Figure 2e & 2f)

There are no major morphological differences between male and female *C. scutellata*. Females have the last abdominal segment blunt with prominent genital plates (Figure 2e) whereas males can be distinguished from the females by the notched appearance (V-shaped) medially in the genital capsule (Figure 2f). Labium length varies in both male and female. Distinct variability is seen in labial length of both the sexes. In the case of male, labium reaches upto 1<sup>st</sup> abdominal segment and sometimes extend beyond it, but in females, labium reaches upto 2<sup>nd</sup> abdominal segment and extends beyond it. The patterns of dark spots present on the ventrolateral side of male are denser than in female.



**Fig 2:** a. Dorsal view; b. Ventral view; c. Dorsal Anterior view; d. Foreleg showing Spine; e. Posterior abdominal segments of female (ventral view); f. Posterior abdominal segments of male (ventral view)

## Conclusion

Original descriptions of general colouration and characters were given by Distant (1887) which helped us to identify this bug species. More diagnostic characteristics have been included in this report which was not reported earlier by any of the workers. These characters can be utilised as an additional diagnostics tool to separate allied species. We believe, this record is part of its natural distribution but probably due to lack of attention on heteropteran study as well as its associated host plants, it has remained unknown to this date from this region. Knowledge of the host plant of an insect is important to understand its distributional range, biology, and ecological role. This study will add information on the host plant of this bug which was severely lacking in all the previous studies of this bug.

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