



Redescription of *Carbula aliena* Distant, 1918 (Hemiptera: Heteroptera: Pentatomidae) from West Bengal, India with reference to male genitalia and a key to the Indian species

Amartya Pal¹, Swetapadma Dash¹, * M. E. Hassan² and Devanshu Gupta¹

¹Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal, India-700053

²Zoological Survey of India, Gangetic Plain Regional Centre, Sector -8, Vijay Nagar Bahadurpur Housing Colony, Patna - 800026

Abstract

Carbula aliena Distant, 1918 (Hemiptera: Heteroptera: Pentatomidae) is re-described and illustrated based on the material collected from the Alipurduar district, West Bengal, India. New characters are included, along with illustrations of male morphometric measurements to facilitate easy species detection. A key to the Indian species of *Carbula* Stål, 1865 is also prepared.

Keywords: Taxonomy, Stink bugs, identification key, morphometric measurements, key.

Introduction

The genus *Carbula* Stål, 1865 (Hemiptera: Pentatomidae) is represented by 76 species from the world (Kaur, 2013) with 10 species from India. Genus *Carbula* is characterized by broadly ovate body; head rounded or somewhat truncated at apex with lobes of equal length; first segment of antennae not reaching the apex of the head and having pronotum with anterolateral margin generally obtuse, terminated by a rarely crenulated levigate margins. The genus *Carbula* could be differentiated from its allied genus *Eysarcoris* Hahn, 1834 in having scutellum apically narrowed and distinctly shorter than corium (scutellum apically broad and equal to corium in *Eysarcoris*).

Distant (1918) described the species *Carbula aliena* based on external colouration and a few morphological features, which are insufficient to identify the species correctly. This species was reported only from Karnataka: Chikkaballapura (Distant, 1918), Mysuru, Fraserpet (Chatterjee, 1934). While working on a collection of Himalayan and sub-himalayan

Pentatomidae, we found one specimen of *C. aliena* from Alipurduar district, West Bengal, India. This paper aims to re-describe and illustrate this species, along with illustrations of male genital and to provide new distributional record from sub-himalayan region of West Bengal. We also prepared an identification key to the Indian species of *Carbula* Stål, 1865 from India.

Material and Methods

The material for the present study includes dry-pinned specimens housed at the Hemiptera Section of the Zoological Survey of India, Kolkata, West Bengal. Photographs were taken using Leica M205A stereomicroscope with a coupled Leica DMC 4500 camera, and processed in LAS V4.12 software to perform morphometric measurements. Photographs were edited using Adobe Photoshop CS (Version 8.0). Male genitalia were dissected following Ahmad (1986). Identities of species were confirmed through morphology of the male genitalia. Morphological terms used

for male genitalia follow Salini (2019). There is no female specimen in the collection. All measurements are given in millimetres.

Results and Discussions

Taxonomy

Carbula aliena Distant, 1918 (Figs 1–8)

Carbula aliena: Distant, 1918: 133.

Type locality. INDIA: Karnataka: Chikkaballapura

Material examined: 1♂, INDIA: West Bengal, Alipurduar district, South Rydak Range, 04.xi.2018, M.E. Hassan and party (Lat.: 26.572154 N, Long.: 89.768288 E).

Body: Macropterous, yellowish brown mottled with black spots, shiny, densely and coarsely punctate black.

Dorsal coloration: General colour yellowish brown mottled with black spots (Figure 1); The marginal lines on both the lateral lobe of head are black; eyes reddish-brown; anterior lateral margins of pronotum and basal 1/3rd of hemelytra pale yellow; humeri black; first three segment of antennae pale yellow, segment IV and V yellowish brown but apical two-third portion of segment V somewhat dark brown than rest of the portion; basal part of corium reddish brown, but the apical portion darkly punctated.

Ventral Coloration: Abdomen yellowish brown with a broad central reddish brown band on 2nd and 3rd abdominal segment, rostrum yellowish brown with the apex black; legs yellowish brown with blackly punctuations; genital capsule, dark brown.

Head: Slightly wider than longer including eyes (Width : Length 1 : 0.92), mandibular plates usually reach the apex of clypeus; antennae five-segmented, segment IV longest, segment V longer than II, III, segment I smallest; rostrum long, four-segmented, reaches up to the metacoxae or slightly passing it, segment I is the longest (Figure 4).

Thorax: Pronotum subtriangular, wider than longer, its width is about 2.5 times than its length and about 3 times

wider than head, anterolateral margins smooth, humeral angles of pronotum produced laterally into comparatively blunt and short spinous projection (Figure 3); scutellum slightly broader than longer (1.00 : 0.96) with a Y-shaped pale yellowish mark at middle portion and punctate except each basal angle and the apex; hemelytral membrane passing tip of abdomen (Figure 2); legs with fine hairs on tibia and tarsus and blackly punctate; prominent black spots on the base of each coxae.

Abdomen: Abdomen broader than longer (1.00: 0.73) and with a broad central reddish brown band on 2nd and 3rd abdominal segment (Figure 2).

Male genitalia: *Pygophore.* Slightly broader than longer (1.00 : 0.82), quadrangular, dorsal rim moderately concave between caudal lobes with small, narrow median notch; ventral rim concave with broad V-notch medially (Figure 5). *Phallus.* Phallotheca elongate, slightly narrowed proximally and sclerotized, one pair of slightly sclerotized processes of aedeagus, encircled by transparent, membranous conjunctival processes which longer than processes of aedeagus; aedeagus short, tubular and much shorter than processes of aedeagus (Figure 6). *Paramere.* Moderately sclerotized, crown bilobed (Figure 7, 8), Upper lobe of parameres slightly angulate apically with another apically rounded short process which is smaller than main lobe, lower lobe more or less slender, slightly curved upwards facing towards upper lobe, inner margin of lower lobe brownish; stem short.

Measurements: (in mm)

Male (n = 1). Body length 6.495 head: length 1.269, width (across eyes) 1.368, interocular width 0.673; ocular length 0.383; ocular width 0.288; antennal segments: I 0.378, II 0.606, III 0.530, IV 0.985, V 0.897; rostral segments: I 0.875, II 1.068, III 0.559, IV 0.414; pronotum length 1.711, width: 4.269; scutellum length 2.281, width (at basal angles) 2.361; Corium length 3.228, width 1.150.

Distribution: India: Karnataka (Chikkaballapura, Mysuru, Fraserpet) and West Bengal (Alipurduar) (Figure 9).

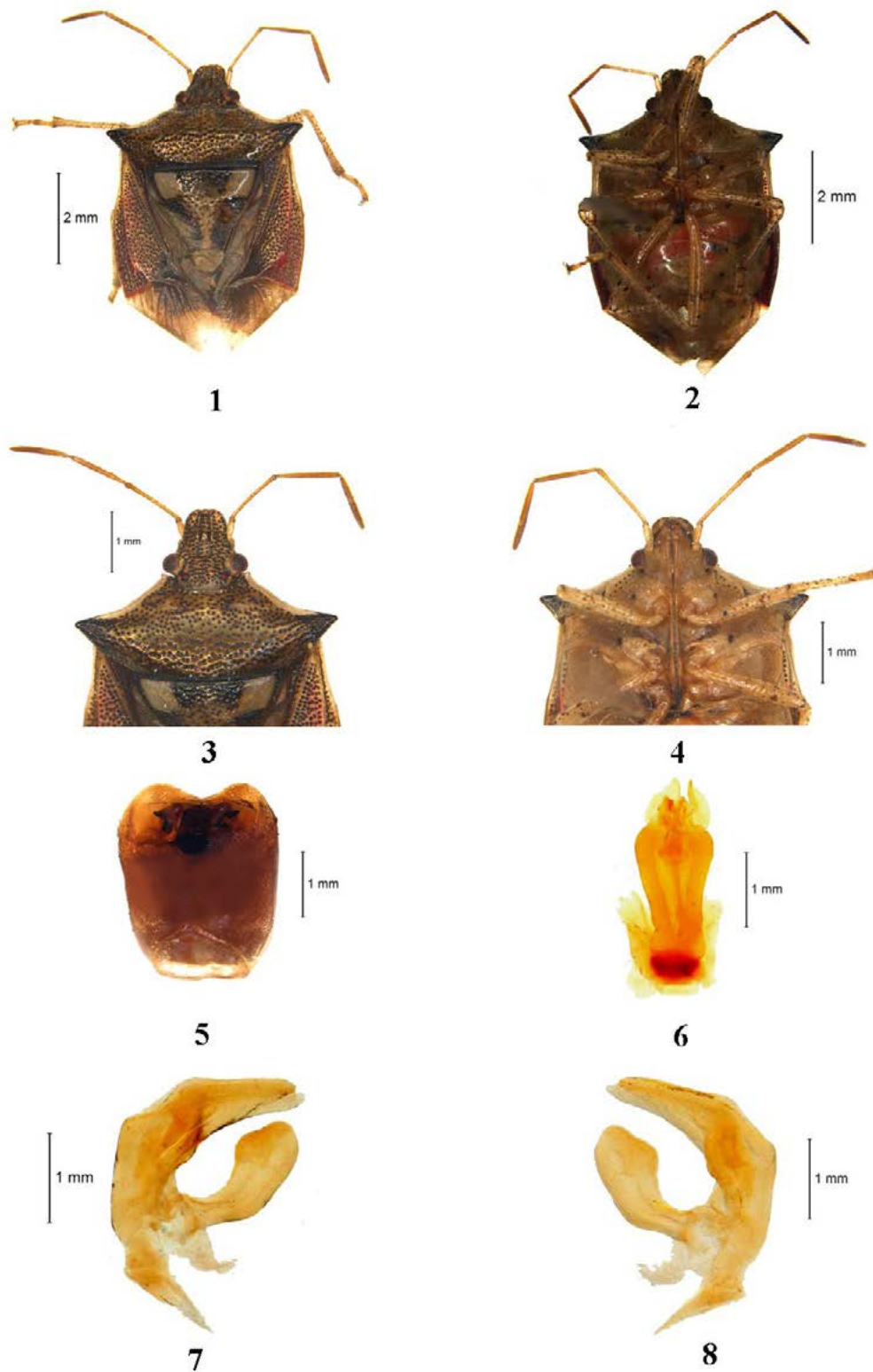
Key to species of *Carbula* Stål, 1865 from India

- 1 Antero-lateral margins of pronotum smooth, luteous levigate and not crenulated 2
 - Antero-lateral margins of pronotum crenulated 9
- 2 Humeral angles obtusely angulate ***socia* (Walker, 1867)**
 - Humeral angles usually spinously produced 3
- 3 More upwardly and forwardly directed humeral angles, scutellum densely punctate ***aliena* Distant, 1918**
 - Less upwardly and forwardly directed humeral angles, scutellum sparingly and coarsely punctate 4
- 4 Scutellum with a Y-shaped luteous mark at middle portion and punctate except each basal angle and the apex
 ***scutellata* Distant, 1887**
 - Scutellum uniformly brownish-ochraceous without any Y-shaped luteous mark 5
- 5 Central continuous spot on each of the abdominal segments; rostrum passing metacoxae reaching up to II abdominal segment but sometimes up to anterior margin of III abdominal segment, humeral angle less produced with apices broadly subacute ***indica* (Westwood, 1837)**
 - Central spot on each of the two terminal abdominal segments; humeral angle broadly produced with apices obtuse and slightly paler and levigate 6
- 6 Rostrum just passing the posterior coxae ***crassiventris* (Dallas, 1849)**
 - Rostrum reaching posterior coxae 7
- 7 Pronotum with lateral angles broadly produced and obtusely prominent; scutellum without any small spot near each basal angle ***rugulosa* Distant, 1902**
 - Pronotum with lateral angles strongly produced, black and robust; scutellum with a small spot near each basal angle. . 8
- 8 Antenna pale castaneous, second and third joints subequal, fourth with the apical area black, fifth black with the base ochraceous; legs testaceous ***aspavia* Distant, 1908**
 - Antenna with the first, second, and third joints ochraceous, fourth and fifth black with their bases ochraceous; legs finely black-spotted ***producta* Distant, 1901**
- 9 Humeral angles with subacute spines, very slightly directed backward ***biguttata* (Fabricius, 1794)**
 - Humeral angles rounded without any spines ***insocia* (Walker, 1868)**

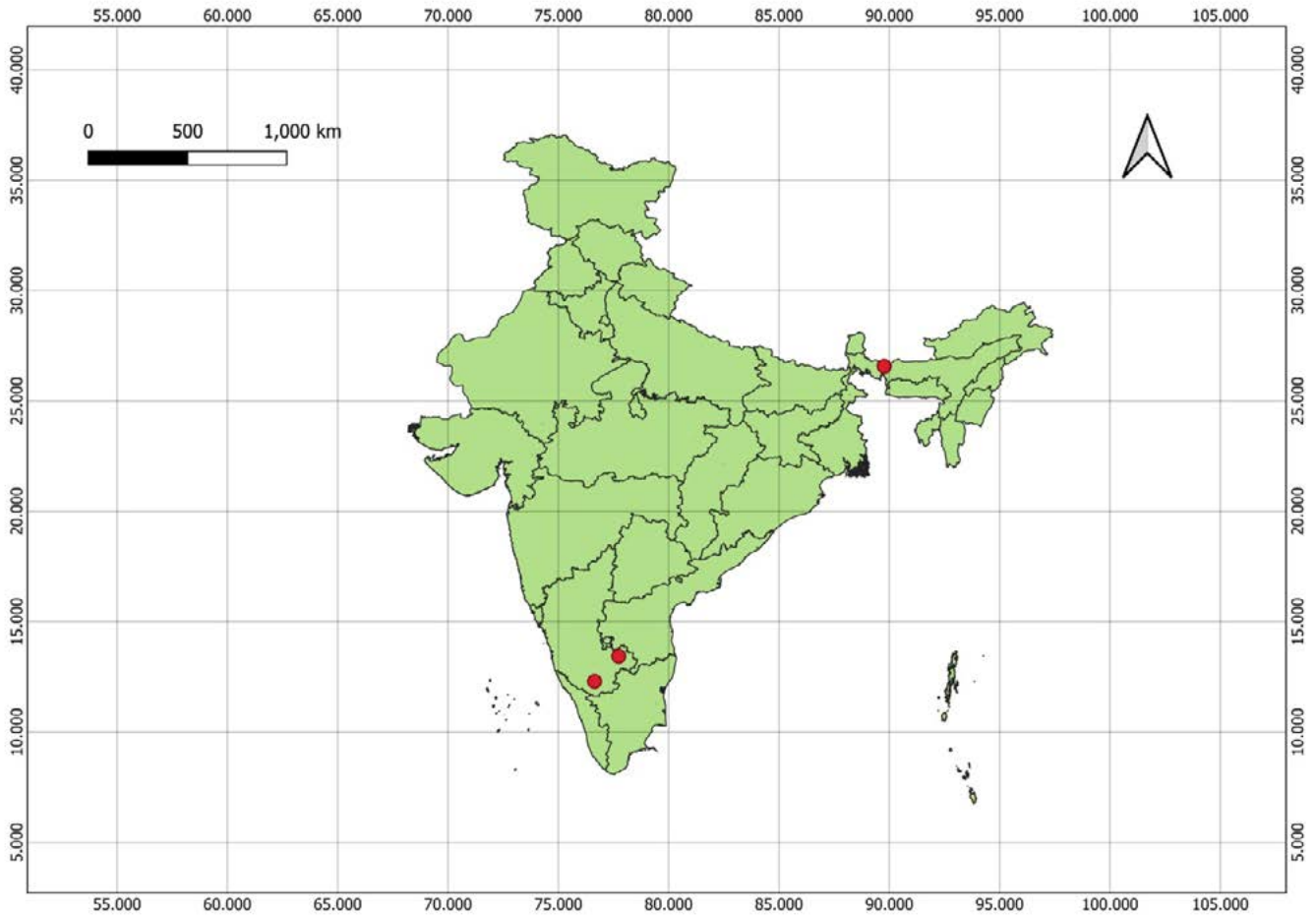
Discussion

Carbula aliena Distant, 1918 is much allied with *C. scutellata* Distant, 1887 during re-examination of the respective specimens we found some minute morphological differences between these two species. Re-examination revealed that humeral angle of pronotum shorter and more forwardly

directed in *C. aliena*; in comparison with *C. scutellata* the scutellum of *C. aliena* is more densely and darkly punctuated; *C. aliena* is smaller than *C. scutellata* in body size. Along with these morphological differences we need the proper description of male genitalia of *C. aliena* to distinguish this species from allied ones. Thus we need to re-describe *C. aliena* to solve the above mentioned taxonomic puzzles.



Figures 1–8. *Carbula aliena* Distant, 1918. 1. Habitus (dorsal view), 2. Habitus (ventral view), 3. Head and Pronotum, 4. Ventral (Thorax), 5. Pygophore (dorsal), 6. Phallus, 7-8. Paramere,



Figures 9. Distribution Map of *Carbula aliena* Distant, 1918

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