ABSTRACT

Halyabbas unicolor Distant, the only representative under genus Halyabbas Distant have no published records in the literature of Pentatomidae with respect to its taxonomic details. Taxonomic studies have been conducted on this genus, supported with various reliable taxonomical characters like morphometry, external morphological structures emphasizing on shape and structure of head, pronotum, metathoracic scent gland osteolar peritreme, ventroanterior and ventroposterior margin of abdominal sternite VII, dorsal and ventral colorations and external male genitalic structures (pygophore, paramere and aedeagus) and female genitalic structures (spermatheca and female genital plate). Besides, a new Indian locality of its distribution has also been added to its previous list for the first time.

Keywords: Halyabbas, Pentatomidae, genitalia, morphology.

1. Introduction

The true bugs or Heteroptera, is a highly diverse insect taxon with approximately 42,300 described species worldwide, represented by seven infraorders and 75–89 families. Within the suborder Heteroptera, family Pentatomidae is known to form the third largest family, surpassing Reduviidae and Miridae. Pentatomidae are one of the largest families of the order, spread over the tropical and temperate zones, most abundant in tropical regions. The Indian fauna is Indo-Malayan mostly, with a number of Palaearctic hill forms which extend into the north and with the larger number of species known only from hill or submontane forest localities. Of the estimated 39,096 described species of Heteroptera from the world, 4772 species within 896 genera belong to this family. Globally, these insects represent an important part of the fauna as far as their number is concerned. They are generally known with some common names to all the taxonomists, such as “Shield bugs” due to the shield-shaped body; ‘Stink bugs’ because of the emission of a disagreeable pungent odor by means of a pair of scent glands which open in the region of the metacoxae and “Pentatomidae” because of distinct five segments in an antennae or because their body appears to have five parts. Most of the taxa within the family exhibits sexual dimorphism, with respect to variation in size, coloration and form. They act as one of the major agricultural pests of economically important crops throughout the world, that includes legumes (Soybeans); cereals (rice, wheat), tree crops (coconut, palms, citrus, cocoa, coffee). Most of these are host specific and thus depending on the type of plant they attack, their economic importance varies greatly from species to species, and also within a species, it may range to multiple hosts. Few Pentatomidae members are also exclusively predaceous and are known to show Intraguild Predation (IGP). Throughout the Heteroptera, the imago is a very important and active stage of life, the previous development being practically only a growth in size, with the gradual development of wings. As far as Indian region is concerned, very few workers have directed their research towards heteroptera fauna after the publication of Distant’s Fauna of British India.

2. Material and methods

Collection-cum-survey tours were carried out in different localities of North India that includes...
the states of Punjab, Haryana, Himachal Pradesh, Uttarakhand, Union Territory of Chandigarh, NCR region of Delhi and parts of Jammu and Kashmir during Nov, 2008- Oct, 2011. Single female and male specimens belonging to the species *Halyabbas unicolor* were collected from Nainital (Uttarakhand). Identification was done with the help of “Fauna of British India [10] and Rider’s catalogue [11]. For preparing the slides of external female genitalia, the abdomen was potashed in 10% KOH and boiled for 5-10 minutes on a gas burner so as to expose its genital plate and spermatheca. After proper dehydration, the plate was cleared in clove oil and preserved. The spermatheca was preserved in 70% alcohol. For external male genitalia, the entire abdomen was potashed in 10% KOH and kept in oven for 15-20 minutes. The pygophore was dehydrated in various grades of ethyl alcohol and preserved in clove oil for further studies. Later, the pygophore was dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification. The dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification. The dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification. The dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification. The dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification. The dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification. The dissected to separate out the internal parts viz., parameres and aedeagus that form the taxonomical tools in identification.

3. Observations

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Genus *HALYABBAS* Distant, 1900


*Halyabbas unicolor* Distant


**Type-locality** – Burma; Siam; Lombok; Hong Kong

**Body length**: ♀ - 13.50 mm; ♂ - 13.10 mm (Fig. 1A)

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3.1 Female

**Measurements (mm)**: Head length: 1.90; width across eyes: 2.80; interocular space: 1.70; intercellular space: 0.90; preocular distance: 1.05; length of posterior head including eyes: 0.85; antennal segments lengths: I: 0.50, II: 1.0, III: 0.80, IV: 1.05, V: 1.30; pronotal length: 3.20; width across humeral angles: 7.25; scutellar length: 5.0; scutellar width: 4.50; length of abdomen: 6.10; maximum width of abdomen: 6.93; length of rostral segments: I: 0.90, II: 1.60, III: 1.10, IV: 0.75; Distance - base scutellum-apex clavus: 3.10; apex clavus-apex scutellum: 1.85; apex scutellum-apex abdomen including membrane: 4.75; total body length: 13.50.

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**Dorsal Coloration**: Head pale greenish, coarsely and darkly punctured with black; eyes brownish black; occelli brown; boundaries of eyes and their posterior margin pale yellowish green, area before eyes impunctate and green; 1st and 2nd antennal segments green, 3rd and 4th darker, 5th somewhat indiscernible; pronotum greenish, darkly punctate, anterior margin dark green and impunctate; anterior pronotal area with two green irregular transverse callosities; humeral angles yellowish green, darkly punctured, more pronounced laterally; scutellum green, darkly punctured with black; calyces and corium yellowish green, sparsely punctured with costal margin densely punctuate; anteriormost portion of costa pale, impunctate; connexiva yellowish green, suffused with black and brown, blackly punctured; hemelytra membrane brown.

**Ventral Coloration**: Labium yellowish green, apex black; legs yellowish green, apex of tibiae and tarsi darker with brown suffusions; head green, punctate; area between legs paler; lateral areas of sternum green, thickly punctured with series of irregularly scattered black punctures, with distinctly black margins; metathoracic scent gland opening yellowish green with brown punctures, evaporatorium impunctate; abdomen dark green with brown fascia, lateral area impunctate, green with a medial elongated brown spot on sternite VII; genital capsule admixture of brown and green, pilose with golden brown.

**Head** (Fig.1B): Distinctly wide, strongly declivitous downwards, rugulose; paraclypeal lobes slightly longer, meeting in front of elypeus, lateral margins sinuous above eyes, reflexed anterolaterally, narrowed and subrounded at apex; elypeus slightly raised medially; antennal segmental formula – I-III<II<IV< V; labium reaching metacoxae, labial lengths formula – IV<1<III<II.

**Thorax**: Pronotum (Fig.1C) with anterior margin concave, truncate behind eyes, produced as small subacute tubercles directed anterolaterad, anterolateral margins crenulate, posterolateral margin obliquely straight, lateral margins upwardly reflexed, humeral angles subrounded, obtuse and posterior margin straight; scutellum broad at base, beyond frena slightly sinuous, narrowed as subtriangular apical lobe; connexive well exposed at repose; metathoracic scent gland ostolear peritreme (Fig.1D) small, raised, slightly sinuous, narrowed at apex, reaching only one fourth way to metasternal margin; evaporatorium moderately large, distinctly broad, with well-defined anterior and posterior margins, slightly concave medially, covering about two third sternite; legs hairy.

**Abdomen**: Ampliate medially, flattened laterally; inner margins of spiracular boundaries spotted with black; hemelytra membrane passing beyond abdominal apex; ventroanterior margin of
abdominal sternite VII broadly concave, somewhat an inverted U-shaped with acute posterior angles (Fig.1E).

**Halyabas unicolor Distant**

Genitalia: 1st gonocoxae medially wide apart, quadrangular with posterior margins straight and inner margins parallel; 2nd gonocoxae fused medially, slightly concave; 8th paratergites broadly triangular, posterior margins with a tooth like angulation; 9th paratergites elongate, lobe-like, inner margin medially produced, passing beyond fused posterior margin of 8th paratergites (Fig. 2A); spermatheca (Fig. 2B) with distinct distal and proximal flanges; pump region distinctly short, smaller than distal spermathecal duct; bulb small, flattened with two finger like lobules; medial dilation balloon like; proximal spermathecal duct sclerotized, subequal to distal spermathecal duct.

3.2 Male Measurements (mm): Head length: 2.0; width across eyes: 2.59; interocular space: 1.45; intercellular space: 0.80; preocular distance: 1.10; length of posterior head including eyes: 0.90; pronotal length: 3.20; width across humeral angles: 6.93; scutellar length: 4.50; scutellar width: 4.20; length of abdomen: 5.94; maximum width of abdomen: 6.60; length of rostral segments: I: 0.80, II: 1.35, III: 1.0, IV: 0.90; Distance - base scutellum-apex clavus: 3.0; apex clavus-apex scutellum: 1.50; apex scutellum-apex abdomen including membrane: 3.52; total body length: 13.10.

**Coloration and Structure:** Body form and coloration similar to female except, male being comparatively darker and with dense black punctures; ventroanterior margin of abdominal sternite VII concave, somewhat dome-shaped with subacute posterior angles and ventroposterior angles broadly concave, somewhat an inverted U-shaped (Fig.1F).

Genitalia: Pygophore (Fig. 2C) as long as broad, lateral margin straight with prominent narrowly rounded dorsolateral lobes; dorsal opening small; dorsomedial surface broadly concave; ventroposterior margin sinuate; paramere (Fig. 2D) somewhat sickle shaped, apex of blade oar like, outer margin convex with medial hump; inner margin with a small nodule near base; aedeagus (Fig. 2E) with theca broad at base, narrowed apically, a pair of elongate dorsolateral membranous conjunctival appendages, sclerotized at apices, directed laterad; a pair of ventral conjunctival appendages, fused basally; a pair of elongate spindle like sclerotized medial pineal lobes, not fused basally; vesica distinctly long, passing much beyond margins of medial pineal lobes; ejaculatory reservoir area broad.

**Halyabas unicolor Distant**

Altitude at Naini Tal (in metres): 2,084 metres (6,837 ft)

3.4 Host: Bambusa sp.[16, 10]; Phyllostachys pubescens[15]: both Poaceae.

3.5 Distribution: India (Uttarakhand, Kerala), Burma (=Myanmar); Hong Kong.

3.6 Remarks: This genus and species are recorded for the first time from North India and a new locality has been added to its previous list. Its detailed morphology and external genitalia has also been studied for the first time. It has been recorded as a pest on Bambusa sp., and Phyllostachys pubescens (Poaceae) from Asia (Burma, Yunnan and China)[6, 14].

4. Acknowledgements
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5. Abbreviations used
8th pt. - Eight paratergites; 9th pt. - Ninth paratergites; Sp. b. - Spermathecal bulb; Dis. f. - Distal flange; Prx. f. - Proximal flange; Dis. sp. d. - Distal spermathecal duct; Prx. sp. d. - Proximal spermathecal duct; Md. - Median dilation; Sp. p. - Spermathecal pump; Vpm. - Ventroposterior margin; Dl. l. - Dorsolateral lobes; Dms. - Dorsomedial surface; DO. - Dorsal Opening; Bl. – Blade; Stm. – Stem; Bp. - Basal plate; Piv. – Pivot; Th. – Theca; Ves. – Vesica; Gp. – Gonopore; Pl. - Pineal lobe; Dlm. app. - Dorsolateral membranous conjunctival appendages; Ej. r. - Ejaculatory reservoir.

6. Reference