

# Metathoracic Scent Auricle and Genitalia of Pentatomine Stink Bug *Caystrus pallipes* (Stål) (Hemiptera: Pentatomidae) and Their Bearing on its Phylogenetic Relationship

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**Abstract.-** New characters with reference to body parts, their morphometrics, metathoracic scent auricle and those of male genitalia including pygophore, paramere and inflated aedeagus were explored in the little known caystrine stink bug *C. pallipes* (Stål) and in this light its phylogenetic relationship is also briefly discussed.

**Keywords:** Caystrini, Pentatomidae, *Caystrus pallipes*, phylogenetic relationships of stink bug.

## INTRODUCTION

Stål (1867) described the genus *Odius* and Stål again described his new species *pallipes* under his genus *Odius* in 1871. He followed his above placement 1876 and Lethierry and Severin in 1893. Kirkaldy (1909) placed it under *Neodius* followed by Parshad (1957). Black (1968) for the first time placed it under *Caystrus* followed by Ueshima (1979), Nuamab (1982) and Cassis and Gross (2002), but none of them gave any illustration and measurements of the body parts, metathoracic scent auricle and male genitalia including those of pygophore, paramere and inflated aedeagus and based their redescription on features of color pattern etc. Presently these new characters are explored in detail and in this light the phylogenetic relationship of this species is briefly discussed.

## MATERIALS AND METHODS

Male type specimen of *C. pallipes* (Stål), a widely distributed species known from India, Philippine, Australia and from Bismark Archipelago (New Ireland) was borrowed and studied from Stål's collection of Riks Natural History Museum, Sweden, by the courtesy of the authorities of that museum. Other identified and unidentified

specimens were also studied by the present second author during his visit to that museum by the courtesy of Dr. E. Kjellander and the authorities of that museum. We followed the techniques of Ahmad and Kamaluddin (1985) and Ahmad and Afzal (1979, 1989) for measurements, illustrations and description. For the examination of male genitalia including pygophore, paramere and inflated aedeagus that of Ahmad (1986) and Ahmad and McPherson (1990, 1998) were generally followed. After the aedeagus was fully inflated illustrations of pygophore, paramere and inflated aedeagus were made in different views, the components of genitalia were transferred into a microvial with a drop of glycerine and pinned with the insect. All the measurements are in millimeters and all the illustrations are to the given scales.

*Caystrus pallipes* Stål  
(Fig. 1)

*Odius pallipes* Stål 1871: 624; 1876: 71; Lethierry and Severin, 1893: 112.

*Neodius pallipes*: Kirkaldy, 1909: 42.

*Caystrus pallipes*: Black, 1968: 563; Ueshima, 1979: 80; Cassis and Gross, 2002: 464.

### Colouration and general shape

Body pale with thickly brownish black punctures all over the body; eyes brown with reddish tinge; ocelli pinkish.

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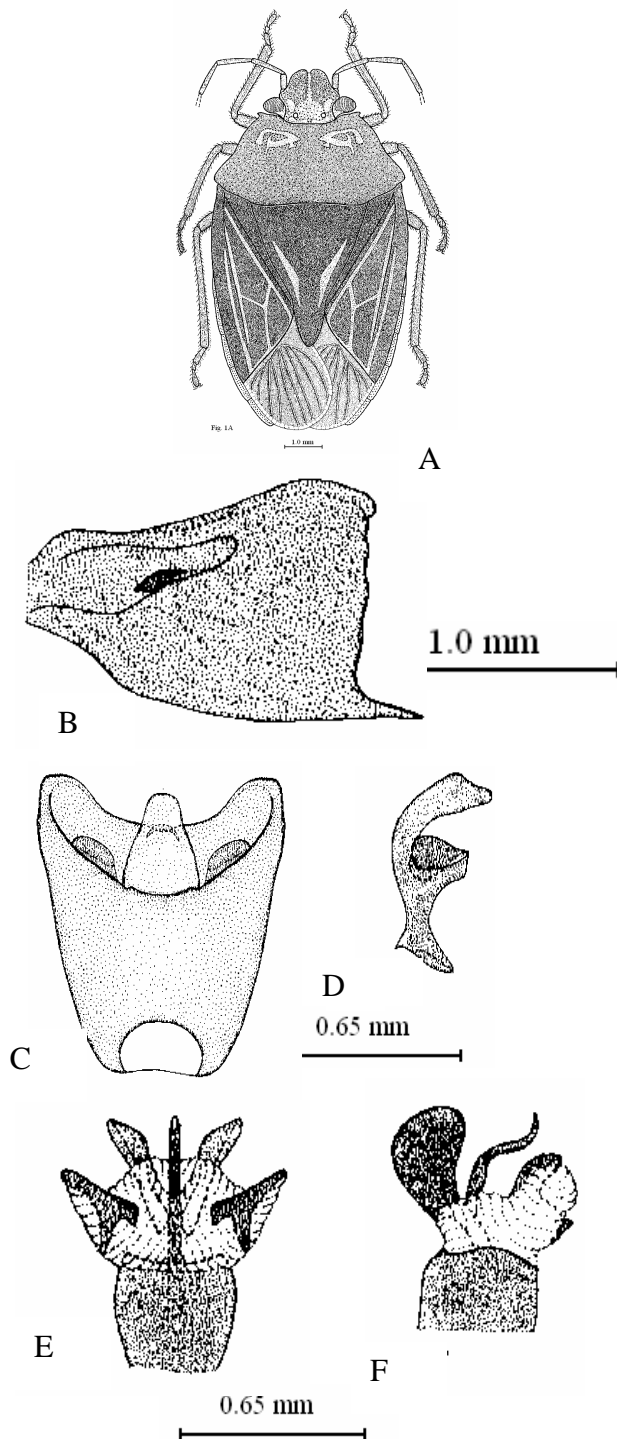


Fig. 1. *Caystrus pallipes*: A, dorsal view; B, metathoracic scent auricle, ventral view; C, pygophore, dorsal view; D, paramere, inner view; E, inflated aedeagus, ventral view; F, same, lateral view.

### Head

Broader than long; anteocular distance slightly less than remainder of head; paraclype much broad and much longer but not enclosing clypeus, posterolateral margin strongly concave, terminating anteriorly in front of eyes with sub rounded angle, apex of head smoothly rounded; antennae with basal segment distinctly shorter than head apex, II segment equal to third in length, length of segments I 0.55, II 1.0, III 1.0, IV 1.0, V mutilated; length of anteocular distance 0.9, remainder of head 1.0 width of head 2.5; interocular distance 1.5; interocellar distance 0.85.

### Thorax

Pronotum distinctly less than 2.0 x broader than long, anterior margin distinctly broader than head width, anterior angles toothed directed lateral, humeral angles subacutely produced, anterolateral margins distinctly sinuate, posterolateral margin weakly sinuate, length of pronotum 2.2, width 5.05; scutellum distinctly longer than broad with subrounded apical lobe, length of scutellum 3.7, width 3.2; metathoracic scent auricle (Fig. 1B) thumb-like, basally broad, reaching to posterior margin of evaporatoria with anterior and posterior margins concave, later very much developed, ostiole slit-like; base scutellum-apex clavus 2.9; apex clavus-apex corium 1.7, apex corium-apex abdomen including membrane 1.6; apex scutellum-apex abdomen including membrane 2.6.

### Abdomen

Convex beneath, connexiva distinctly but very little exposed at corners, abdomen shorter than membrane of hemelytra; total length. 10.4.

### Male genitalia

Pygophore (Fig. 1C) somewhat rectangular, dorsomedian surface medially slightly concave with a large unilobed process at inner lateral margin, lateral lobes subacutely produced, ventro-median surface medially slightly pushed; paramere (Fig. 1D) some what F-shaped, lateral margin convex, apex narrowed, bluntly, subrounded at apex, inner lobe without setae; aedeagus (Figs. 1E-F) having theca without thecal appendage, vesica of moderate size, curved, length about equal to that of penial

lobes, paired broad ventral membranous conjunctival appendage and pair of triradiate ventrolateral sclerotized conjunctival appendages present.

#### Material examined

Holotype male, Semper, "299", Ins. Philippine, lodged at Riks Museum of Natural History, Stockholm.

#### Distribution

India, Phillipine, Australia and from Bismark Archipelago (New Ireland).

#### Comparative note

This species is most closely related to *C. bergmani* in having paraclypei apically rounded in front and third antennal segment much shorter in length equal to second but it can easily be separated from the same in having dorsomedian line not developed and longitudinal fasciae parallel in the middle on scutellum.

## DISCUSSION

Nothing was known about the phylogenetic relationship of this species for almost all of the characters used for this purpose were unknown in the literature. Zahid and Ahmad (2007) for the first time when described their new species *Caystrus bergmani* considered it most closely related to *C. pallipes* (Stål). The cladogram (Fig. 2) shows the analysis of the phylogenetic relationships of various species of *Caystrus* widely distributed in the Ethiopian Palaearctic, Oriental and Australian regions. The Centre of origin of this genus seems to be some where in the Oriental region (probably in China or in Indian subregion) from where in the east it has extended into Indonesia, New Hebrides and to Australia in the extreme east.

The members of *Caystrus* appear to fall into two groups one group appears to represent Asiatic stock defined by the synapomorphic characters *i.e.*, paraclypei in front of eyes making a lobe and lateral margins of pronotum at least slightly bilobed. This Asiatic and Australian clade appears to fall into two subclades. The first subclade represented by *pallipes*, *bergmani*, *orientalis* and *obscurus*

(Distant) appear neatly bound together by the synapomorphic character *i.e.*, paraclypei only slightly longer and never enclosing clypeus appear to play out group and sister group relationships with the other *depressus* Ellenrieder subclade (Fig. 2). The first subclade appears to fall into two sister groups, first represented by *pallipes* and *bergmani* and playing out group relationship with the other sister group of this subclade represented by *orientalis* and *obscurus* and neatly held together by the synapomorphic trait *i.e.*, paraclypei apically angulate in front.

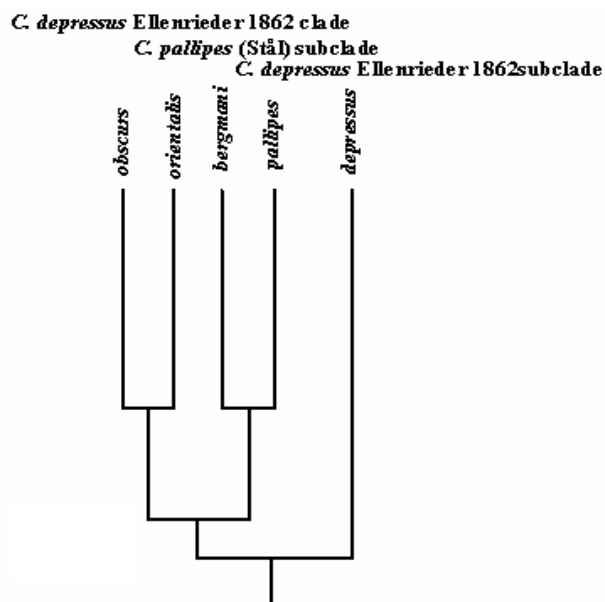


Fig. 2. Cladogram showing phylogenetic relationship of *C. pallipes* with related species.

It appears as noted above that the two sister group species *i.e.*, *bergmani* and *pallipes* share the apomorphic characters of apically rounded paraclypei in front and third antennal segment much shorter, appearing reduced, subequal to second in both the species. However *C. pallipes* appears much more advanced than *C. bergmani* in having apomorphic character of parallel laterally appearing longitudinal lines in the middle of scutellum (but not basally) in contrast to parallel lateral longitudinal fasciae on either side of scutellum in *bergmani* appear from base. Similarly *C. pallipes* appears more advanced in having entirely reduced or absent

mid dorsal line on pronotum and scutellum which appears markedly prominent in *C. bergmani*. This sister group association also shares synapomorphies with *C. orientalis* Zhang and Lin (Zahid 2006 and the present authors in preparation), in having paraclypei somewhat longer than clypeus and never enclosing clypeus and basal outer paraclypeal lobes markedly rounded in front of eyes. *C. pallipes* also appears to be a distinct component of a clade of *Caystrus* Stål *i.e.*, *C. depressus* Ellenrieder 1862 (Fig. 2) in sharing the apomorphies (described below *i.e.*, outer basal rounded lobe somewhat marked in all the members of the above clade) and lateral margins of pronotum some what depressed in the middle giving a bilobed appearance in all the members of this large clade (Fig. 2) (Zahid, 2006).

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