Description of a New Species of *Piezodorus sp.* Fieber (Hemiptera: Pentatomidae) from India With Identification Key

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ABSTRACT

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| A new pentatomid bug, *Piezodorus brevis* sp. nov. belonging to the family Pentatomidae from India is described and illustrated. Stink bugs (*Piezodorus* sp.; Hemiptera: Pentatomidae) are an economically important group of insects in agriculture. Morphological identification can also be complicated by the lack of easily identifiable features in some of the life stages (i.e., eggs and nymphs), colour morphs, and declining taxonomic expertise. This study is based on the eight samples collected in field surveys from Pipalkhuta of Amravati District of Maharashtra (India). Morphological and taxonomical identification were carried out with male and female genitalia. *Piezodorus* *brevis* sp. nov. was described based on the morphology of both male and female genitalia. A key to the Indian species of the genus *Piezodorus* Fieber is provided. Genitalia along with external morphological characteristics demonstrate that this new species differs from all other *Piezodorus* species in its family group. *Piezodorus brevis* sp. nov. strengthens the importance of systematic taxonomy for revealing previously unknown biodiversity. |

***Keywords:*** *Pentatomidae, Pentatominae, Piezodorus, new species, Maharashtra, India*

1. INTRODUCTION

Fieber (1861) established the genus Piezodorus, designating Piezodorus incarnatus (Germar, 1837), as the type species, originating from the Palaearctic region. The genus Piezodorus Fieber,1861, belonging to the family Pentatomidae, subfamily Pentatominae, comprises a total of twelve species globally. Except *Piezodorus guildinii* (Westwood, 1837), all other species have been reported only from the Old World (South Africa, Southern India, Australia, Madagascar, Pakistan). *Piezodorus guildinii* is limited to the New World (Ahmad 1995, Staddon and Ahmad 1995; Sonnekus et al., 2022). This species occurs in numerous countries in Asia and Africa (Rider, 2006). Distant (1902) in his book, “The Fauna of British India including Ceylon and Burma”, included only one species, *Piezodorus rubrofasciatus* (Fabr., 1787) from India, Sri Lanka and Myanmar, which later on was synonymised with *Piezodorus hybneri* (Gmelin, 1790). Many of these species are reported as pests of leguminous crops (Joseph 1953). Staddon and Ahmad (1995) authored a paper on “Species problems and species groups in the genus Piezodorus Fieber (Hemiptera: Pentatomidae)" in which they discussed taxonomic problems in the genus, treated 11 species, and arranged the species into groups and subgroups. *Piezodorus* *hybneri* (Gmelin, 1790) and *Piezodorus* *guildinii* (Westwood, 1837) were regarded as sister species by Ahmad (1995) in a cladistic analysis. They could be separated from other species of Piezodorus by the shorter length of the forward-projecting spine that arises on the third (second visible) abdominal sternite and usually reaches beyond the metacoxae, but does not distinctly reach beyond the mesocoxae (in other species, the spine usually reaches beyond halfway between the meso- and procoxae, sometimes reaching the anterior margin of the procoxae). To date, only one species, *Piezodorus* *hybneri* (Gmelin, 1790) was known from India (Assam, Maharashtra, Sikkim, Uttar Pradesh and West Bengal). Biswas et al., 2014, recorded *P*. *hybneri* (Gmelin, 1790) from different districts of Chhattisgarh (Jagdalpur, Korba, Raipur, Surguja). *Piezodorus brevis* sp. nov, collected by M.E. Hassan and colleagues from Pipalkhuta of Amravati District, Maharashtra (Lat.: 20.8896° N, Long.: 78.1735° E) will be the second species under this genus from India and thirteenth species from the world. The purpose of this paper is to describe a new species of Pentatomid bug belonging to the genus Piezodorus from Amravati district of Maharashtra, India and to provide a key to distinguish its congeners.

2. material and methods

This study is based on the eight samples collected in field surveys from Pipalkhuta of Amravati District of Maharashtra (India). The type series is deposited in the National Zoological Collection of Zoological Survey of India, Kolkata. Morphological measurements and images of the species were taken with a Leica M 205A. All measurements are in millimeters.

3. results and discussion

**3.1 Taxonomy**

***Piezodorus brevis*** **sp. nov.** Figs.1-13

**3.1.1. Diagnosis:** Body oblong, ovate, shiny, punctate. General coloration yellowish-brown with small dark brown punctures ventrally (Fig.2, 3); eyes yellowish-brown; a transverse pale yellow band extends between the two pronotal angles where punctures are sparse underlined with a dark brown band at its basal region (Fig.4); clavus with a small black apical spot; membrane colourless (Fig.5). Antennae brown with a reddish tinge in third, fourth and fifth segments, spiracles black; rostrum yellowish with a median line extending from base of first to end of fourth and apex of fourth segment, black; genital capsule, yellowish-brown and pubescent (Fig.6).

**3.1.2. Head:** Short, narrowed anteriorly, moderately sinuate laterally, wider than longer (1.00: 0.71), slightly produced in front of antenniferous tubercles (Fig.6); antennae five-jointed, 5th longest, 4th longer than 2nd and 3rd, 1st smallest, relative length of antennal joints, A1/A1 : A2/A1 : A3/A1 : A4/A1: A5/A1: : 1.0 : 2.30 : 2.97 : 3.20 : 3.96 (in male), 1.00 : 2.05 : 2.61 : 2.85 : 3.40 (in female); rostrum long, four-segmented, slightly passing mesocoxae, 1st segment is about as long as 3rd segment whereas 2nd segment is about as long as 4th segment, relative length of rostral segments: R1/R1 : R2/R1 : R3/R1 : R4/R1: : 1.00 : 0.81 : 1.02 : 0.83 (in male), 1.00 : 0.84 : 1.05 : 0.92 (in female).

**3.1.3. Thorax:** Pronotum subtriangular, wider than long, slightly more than 2.5X, anterior margin rounded, lateral margins straight and smooth, posterior margin more or less straight with slightly concave above scutellum, humeral angles rounded (Fig.4); scutellum longer than broad (1.00: 0.84) (Fig.5), apex rounded; hemelytral membrane passing tip of abdomen (Fig.5); sternum finely punctate; legs with fine pubescence, mid and hind tibia slightly shorter than femora.

**3.1.4. Abdomen:** Abdomen slightly wider than long (Fig.2) and with a moderately long basal spine, reaching mesocoxae, median part slightly raised and infuscate (Fig.6).

**3.1.5. Male genitalia:** Pygophore longer than broad (1.00 : 0.78), medially in dorsal view (Fig.9); posterolateral angles tumescent (Figs.7, 8), medial area slightly elevated (Fig.7), subpentagonal in shape (Fig.8), sublateral area slightly elevated either side (Fig.7); ventroposterior margin tumescent, weakly elevated and moderately reflexed, medial notch present, broad, u-shaped, tumescence weakly merging with posterolateral angle either side (Figs.7, 8); central opening in dorsal view with anteromedial margin lunate, delimited either side by moderate triangular angulation, posterior margin with two lateral notch on either side, no median notch present (Fig.9). Aedeagus with three pairs of conjunctival appendages, two dorsal, one ventral, first dorsal pair projecting posteriorly, second dorsal pair projecting anteriorly, apices acute, first pair membranous, second pair membranous with dorsal margins sclerotized, first pair longer than second pair; ventral pair bilobed, upper lobe broadest medially, primarily membranous, apical margin acute, lower lobe smaller (Fig.10). Parameres (lateral view) curved anteriorly, with two lateral arm-like broad projections extending from either sides, moderately broad and tapering towards base, blade relatively shorter than *P. hybneri*, outer margin sinuate, with setae, apex recurved, corner slightly angulate, surface reflexed laterally; stem constricted near to base (Fig.11).

**3.1.5. Female genitalia:** Seventh abdominal sternum with posterior margin from posterolateral angle straight laterally and sublaterally, concave submedially, and weakly convex medially (Fig.12). Eighth abdominal tergum ventrally moderately elevated posteriorly. First gonocoxae with posterior margin moderately exposed, weakly concave laterally, moderately convex medially. Second gonocoxae with posterior margin moderately concave. Eighth paratergite with posterior margin evenly weakly arcuate. Ninth paratergite broadly rounded distally with apex not reaching ventral elevation of eighth tergum, outer margin substraight, inner margin without notch near the distal end. Proctiger subquadrangular, narrower than distal 1/4 of ninth paratergite. Spermatheca (Fig.13) with distal bulb moderately constricted basally, proximal bulb distinctly larger than distal bulb and not in line with distal bulb.

**3.1.6. Measurements:** [in mm, ♂, holotype]. Body length 8.975 ± 0.354; Head length 1.526 ± 0.008; head width across eye 2.132 ± 0.107; length of eye: 0.485 ± 0.012; width of eye 0.432 ± 0.001; inter-ocular distance 1.333 ± 0.031; length of antennae 3.838 ± 0.083, lengths of antennal segments I: 0.286 ± 0.027, II: 0.658 ± 0.038, III: 0.849 ± 0.006, IV: 0.916 ± 0.011 and V: 1.133 ± 0.013; rostral length 2.903 ± 0.084, length of rostral segments I: 0.796 ± 0.020, II: 0.641 ± 0.012, III: 0.808 ± 0.036 and IV: 0.659 ± 0.037; length of pronotum 1.905 ± 0.109; width of pronotum 4.780 ± 0.259; length of scutellum 3.416 ± 0.304; width of scutellum (at base) 3.021 ± 0.132; length of abdomen 5.149 ± 0.121, width of abdomen 4.724 ± 0.157; length of forecoxa 0.247 ± 0.005: trochanter: 0.336 ± 0.007, femur: 1.076 ± 0.046, tibia: 1.434 ± 0.010; midcoxa: 0.333 ± 0.005, trochanter: 0.535 ± 0.004, femur: 1.577 ± 0.079, tibia: 1.540 ± 0.072; hindcoxa: 0.439 ± 0.006, trochanter: 0.580 ± 0.001, femur: 2.540 ± 0.038, tibia: 2.362 ± 0.100. [Scale: 1 mm]

[in mm, ♀, allotype]. Body length 9.507 ± 0.497; head length 1.550 ± 0.027, head width across eye 2.187 ± 0.090, length of eye: 0.482 ± 0.016; width of eye 0.442 ± 0.018; inter-ocular distance 1.340 ± 0.020; length of antennae 4.000 ± 0.234, lengths of antennal segments I: 0.336 ± 0.063, II: 0.690 ± 0.051, III: 0.876 ± 0.043, IV: 0.957 ± 0.060 and V: 1.141 ± 0.022; rostral length 2.962 ± 0.110, length of rostral segments I: 0.819 ± 0.049, II: 0.641 ± 0.025, III: 0.833 ± 0.037 and IV: 0.672 ± 0.030; length of pronotum 2.081 ± 0.029; width of pronotum 5.119 ± 0.071; length of scutellum 3.634 ± 0.299, width of scutellum 3.076 ± 0.247; length of abdomen 5.169 ± 0.076, width of abdomen 4.605 ± 0.052; length of forecoxa 0.243 ± 0.015, trochanter 0.365 ± 0.022, femur 1.048 ± 0.007, tibia 1.466 ± 0.020; length of midcoxa 0.338 ± 0.008, trochanter 0.554 ± 0.012, femur 1.628 ± 0.077, tibia 1.657; length of hindcoxa 0.481, trochanter 0.583, femur 2.666, tibia 2.471. [Scale: 1 mm].

**3.1.7. Remarks:** This new species *Piezodorus* *brevis* is closely related to *P. hybneri* (Gmelin) by having a pronotum with punctures more sparse near the transverse band, clavus with small black apical spot, membrane colourless and ventral abdominal spine reaches beyond metacoxae but does not distinctly reach beyond the mesocoxae (Distant, 1902, Ahmad et al., 2019). But can be easily distinguished by the following diagnostic characteristics.

**3.1.8. Key to species of genus Piezodorus Fieber from India:**

1. Body brownish-green; pronotum with a transverse pale or purplish band between the two pronotal angles; pygophore subtrapezoidal in shape, medial notch v-shaped . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *hybneri* (Gmelin)

2. Body yellowish-brown; pronotum with a transverse pale yellow band between the two pronotal angles, pygophore subpentagonal in shape, medial notch u-shaped; . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . *brevis* sp. nov.

**3.1.9. Type material**: Holotype: 1 ♂, INDIA: Maharashtra, district Amravati, Pipalkhuta, 20.897002, 78.169973, 9.xi.2014, M. E. Hassan and colleagues. Paratypes: 3 ♂♂, 4 ♀♀, Maharashtra, district Amravati, Pipalkhuta, 20.897002, 78.169973, 9.xi.2014, M. E. Hassan and colleagues.

**3.1.10. Distribution**: INDIA: Maharashtra.

**3.1.11. Etymology**: Named after its two arm-like lateral broad projections extending from either sides of parameres.

**Fig. 1-8.** *Piezodorus brevis*sp. nov. Male. 1. Dorsal view; 2. Ventral view; Female. 3. Dorsal view; 4. Head and pronotum, dorsal view; 5. Scutellum and hemelytra, dorsal view; 6. Rostrum, ventral view; Pygophore. 7. ventral view; 8. posterior view; Scale line = 1 mm.

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**Fig. 9-13.** *Piezodorus brevis*sp. nov. 9. Pygophore, dorsal view; 10. Aedeagus, dorsal view; 11. Paramere, lateral view; 12. Terminalia (female); Scale line = 2 mm; 13. Spermatheca (female); Scale line = 500 μm.

4. Conclusion

This research presents and illustrates *Piezodorus* *brevis* sp. nov. as a newly discovered Pentatomidae species in India that adds to national bug diversity records. Genitalia along with external morphological characteristics demonstrate that this new species differs from all other *Piezodorus* species in its family group. *Piezodorus brevis* sp. nov. strengthens the importance of systematic taxonomy for revealing previously unknown biodiversity.

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Abbreviations

PLA-Posterolateral angle; MRM-Moderately reflexed margin; T7-Seventh tergum; MN-Medial notch; SLA-Sublateral area; MA-Medial area; S7-Seventh sternum; PM-Posterior margin; LN-Lateral notch; PA-Paramere; CO-Central Opening; TA-Triangular angulation; AM-Anteromedial margin; BL-Blade; ME-Membrane; ST-Stem; SP-Spiracle; PT8-Eighth paratergite; PT9-Ninth paratergite; GX1-First gonocoxa; GX2-Second gonocoxa; GP1-First gonapophyis; PROC-Proctiger; T8-Eighth tergum; DB-Distal lobe; PB-Proximal lobe; 1DCA-First dorsal conjunctival appendage; 2DCA-Second conjunctival appendage.