



Morphology of two Indian species of the genus *Rhyparothesus* Scudder (Hemiptera: Rhyparochromidae)

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ABSTRACT: Morphology including genitalia of two Indian species of genus *Rhyparothesus* Scudder i.e. *kangricus* (Kirkaldy) and *dudgeoni* (Distant) has been studied in detail. Photographs of all the structures have been given which were not available so far. © 2013 Association for Advancement of Entomology

Key words: External genitalia, India, *Rhyparothesus*

INTRODUCTION

The genus *Rhyparothesus* was proposed by Scudder (1962) with *Aphanus orientalis* Distant as its type species. Later on some more species from the Oriental region were brought in its lap by Scudder (1967). The two species being studied here have been collected from North India and their genitalia are being illustrated for the first time. Both the species have been found under leaf litter on ground along with several other species of this family. For describing the external male and female genitalia terminology used by Ashlock (1957) and Scudder (1959) has been followed.

This genus is diagnosed by the following combination of characters: head more or less impunctate; anterior half of pronotal disc punctuate; clavus densely and irregularly punctuate; apical third of corium distinctly punctuate, the punctures present along apical margin; clypeus not greatly exceeding apex of paraclypeal lobes; whole of dorsum pale; except head, anterior part of pronotal disc and base of scutellum dark- brown black.

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MATERIALS AND METHOD

Bugs were collected with the help of insect net from leaf litter and by beating vegetation and branches of trees below which a white sheet was spread. After collection the bugs were killed with ethyl acetate vapours and pinned, stretched and kept in wooden boxes for further examination. For dissection of male and female genitalia the dried specimens were relaxed by keeping them in a pertidish under wet conditions for few hours. Their abdomens were separated from the whole insect and were kept in 10% KOH at 70° temperature for 40-80 minutes depending upon the size of the insect. After dissections, the structures were washed in distilled water and then dehydrated through ascending grades of alcohol, cleared in clove oil and preserved in glycerin for further studies. Photography was done using image processing unit located in the Department of Zoology and Environmental Sciences, Punjabi University, Patiala. Orientation of the genital structures was arranged in such a way that it clearly depicted its distinctive features. All the measurements have been made under stereozoom binocular microscope fitted with a graph eye piece (ocular grid).

RESULTS AND DISCUSSION

Rhyparothesus kangricus (Kirkaldy)

(Figs. 1- 11)

Aphanus kangricus, Kirkaldy 1907, *Canad. Ent.*, **34**: p. 331.

Rhyparothesus kangricus: Scudder 1967 *Bull. Br. Mus. (Nat. Hist.)Entomol.*, **20(6)**: 251-285.

MALE:

Dorsal coloration: (Fig. 1) Head yellowish brown, lateral margins yellowish brown, central two layers dark brown forming a spindle shape structure on clypeus; antennal segments I- IV yellowish brown, apices of segments II and III black, antennae pubescent; eyes dark brown; ocelli brown; pronotum pale yellow with dark brown punctures, anterior portion bright yellow, carina pale yellow; scutellum dark yellow with dark brown punctures; clavus and corium pale yellow with dark brown punctures, fascia near apical edges and posterior edge of corium; connexiva brown; hemelytral membrane brassy color with basal region dark brown.

Ventral coloration: Venter of head dark brown; rostral segments yellowish brown; prosternum dark yellow with dark brown punctures, mesosternum and metasternum brown with dark brown punctures, central area of mesosternum and metasternum dark brown; anterior and posterior lobes of metathoracic peritreme brown; abdominal sternites brown; connexiva brown; genital capsule dark brown.

Legs: Legs yellow with dark brown punctures.

Structure:

Head (Fig. 2): Head broad at base, narrow at tip, wider than long, clypeus longer than paraclypei, clypeus protruding anteriorly, clypeus and paraclypei fused, length of anteocular region same that of remainder of head; antenniferous tubercles widely separated; antennal segment I short and stout, extending beyond apex of head, segments II and III slender, cylindrical, segment IV fusiform, antennal formula $I < III < IV < II$; buccula short, not extending beyond antenniferous tubercles; rostrum short, reaching up to procoxae, rostral formula $IV < III < I < II$.

Thorax: Pronotum (Fig. 3) with carina, wider than long, anterior angles round, anterior margin substraight, lateral margins obliquely round, humeral angles not prominent, posterior margin sinuate; scutellum triangular, wider than long; corium with costal margin anteriorly substraight, posteriorly round; ostiolar peritreme (Fig. 4) broad, reaching more than halfway toward lateral side and near posterior side, anteriorly prominent and posteriorly subprominent.

Abdomen: Hemelytral membrane reaching above last abdominal segment; lateral margins of connexiva round; margins of lateral sides sinuate; ventroposterior margin of abdominal sternite VIII concave (Fig. 5).

Legs: Femora of proleg much thickened, femora of mesoleg and metaleg less dilated, tibiae and tarsi slender, cylindrical, a long thick spine on femora of proleg, hair on tibiae of each leg.

Male genitalia: Pygophore (Figs. 9) spherical with anterior margin straight, outer lateral margin substraight anteriorly broad and posteriorly narrow, posterior margin with median notch, short hair on posterior region, in lateral view anterior margin subround; paramere (Fig. 10) with stem squarish, inner projection squarish with substraight apex, outer projection triangular, broader than inner projection, hair on outer projections, blade long and curved, tapering with subround apex, inner and outer margins round; aedeagus (Fig. 11) with phallosoma broad, conjunctiva without any lobe, ejaculatory reservoir complete, attached to squarish body, wings squarish, a pair of holding sclerites present, vesica broad, gonoporal process long and broad with many coils.

Measurements (in mm): Head length: 0.97; width across eyes: 1.15; length of anteocular region: 0.47; length of remainder head: 0.50; interocular space: 0.70; interocellar space: 0.45; length of antennal segments I: 0.50, II: 1.10, III: 0.70, IV: 1.00; length of labial segments I: 0.65, II: 0.80, III: 0.62, IV: 0.35; pronotum length: 2.10, width at posterior margin: 2.25; scutellar length: 1.30; width: 1.50; length base scutellum to apex clavus: 2.10; claval commissure: 0.75; length of corium: 3.50; length of hemelytra: 4.75; width of membrane: 1.75; length apex scutellum to apex abdomen including membrane: 3.30; maximum width of abdomen: 2.30; total body length: 7.30.

FEMALE:

Coloration: Coloration similar to male except connexival segments VIII and IX black; genital plate black.

Structure: Abdominal sternite VII medially divided, ventroanterior margin of abdominal sternite VII forming inverted V shape structure (Fig. 6).

Female genitalia: (Fig. 7) 1st gonocoxa elongate and triangular, 1st gonapophysis narrow with subacute apex, 8th paratergite almost squarish with outer and inner margins sinuate, 9th paratergite squarish with round lateral margins; (Fig. 8) spermathecal bulb long, tubular with outer margin round, median apical projection round and much broad, duct highly coiled divided in to three parts first part narrow and long, 2nd part spring like, third part with straight tube.

Measurements (in mm): Head length: 1.00; width across eyes: 1.20; length of anteocular region: 0.42; length of remainder head: 0.58; interocular space: 0.75; interocellar space: 0.50; length of antennal segments I: 0.40, II: 1.00, III: 0.80, IV: 1.00; length of labial segments I: 0.65, II: 0.75, III: 0.55, IV: 0.40; pronotum length: 1.80, width at posterior margin: 2.25; scutellar length: 1.55; width: 1.45; length base scutellum to apex clavus: 2.00; claval commissure: 1.10; length of corium: 3.00; length of hemelytra: 4.00; width of membrane: 1.75; length apex scutellum to apex abdomen including membrane: 3.40; maximum width of abdomen: 2.10; total body length: 6.80.

Morphological variations: Head reddish brown; posterior of pronotum covered with punctures light brown; color of clavus and corium black; eyes red; abdominal sternites black; size of male varies from 6.90 to 8.00 mm; size of female varies from 6.50 to 8.00 mm.

Material examined: Punjab: Pathankot, 21.X.2009- 1♂ & 1♀. Uttarakhand: Dehradun, 23-25.VI.2010- 11 ♂♂ 5 ♀♀. Himachal Pradesh: Bilaspur, 21.X.2010- 1♂ 2 ♀♀

Distribution: India: Himachal Pradesh and Uttarakhand.

Remarks: This species is found in abundance on ground vegetation under leaf litter along with other species. It is a seed eater bug and is very similar with *R. dudgeoni* but differs in the shape of pronotum. It was proposed in the genus *Aphanus* by Kirkaldy, but later on shifted by Scudder.

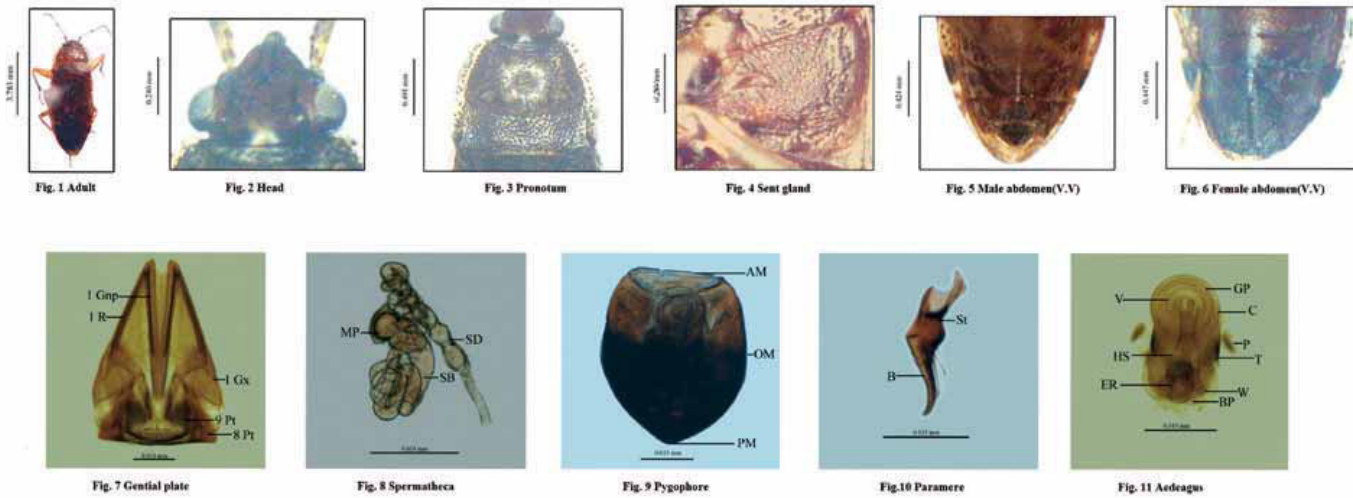
Rhyparothesus dudgeoni (Distant)

(Figs. 12-22)

Aphanus dudgeoni, Distant 1909, *Ann. Mag. Nat. Hist.*, **8**(3):491-507.

Rhyparothesus dudgeoni: Scudder 1967 *Bull. Br. Mus. (Nat. Hist.) Entomol.*, 20(6): 251-285.

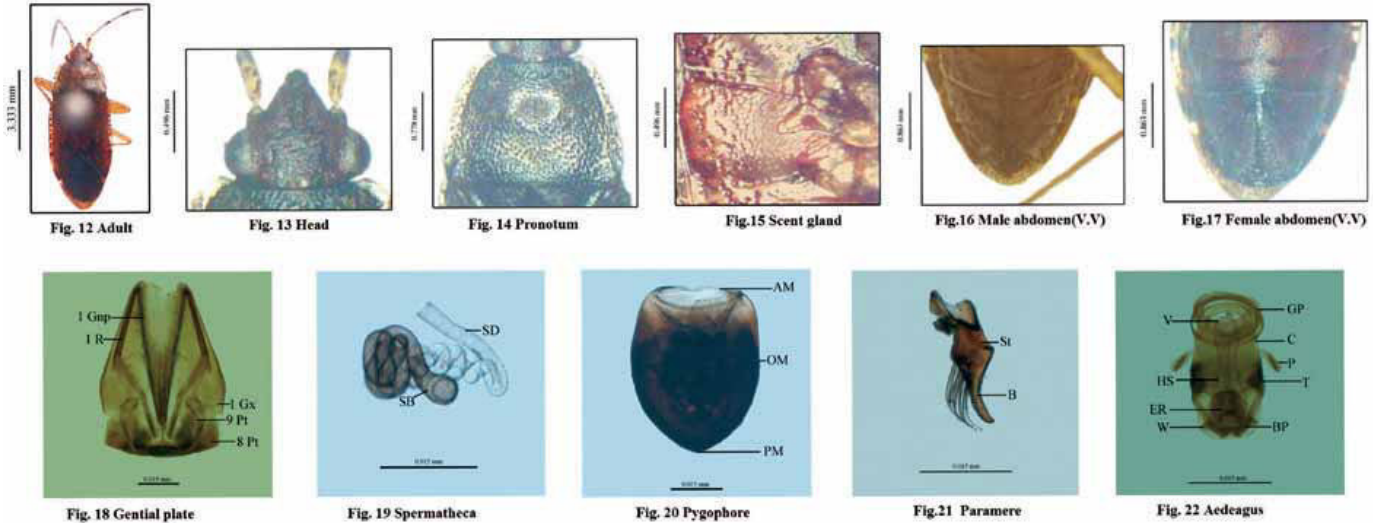
Rhyparothesus kangricus (Kirkaldy)



Figures: *Rhyparothesus kangricus* (Kirkaldy)

(Adult- 1, Head- 2, Pronotum- 3, Scent gland- 4, Male abdomen (V.V.)- 5, Female abdomen (V.V.)-6, Genital plate-7, spermatheca- 8, Pygophore- 9, Paramere- 10, Aedeagus- 11).

Rhyparothesus dudgeoni (Distant)



Figures: *Rhyparothesus dudgeoni* (Distant)

(Adult- 12, Head- 13, Pronotum- 14, Scent gland- 15, Male abdomen (V.V.)- 16, Female abdomen (V.V.)- 17, Genital plate-18, spermatheca- 19, Pygophore- 20, Paramere- 21, Aedeagus- 22).

MALE:

Dorsal coloration: (Fig. 12) Head reddish brown with black lines, dark brown central two layers forming a spindle shape structure on clypeus; antennal segment I yellowish brown, segments II and III yellowish brown with apices black, segment IV black with base brown, antennae pubescent; eyes dark brown; ocelli brown; pronotum pale yellow with dark brown punctures, lateral margins with large brown punctures; scutellum yellow with dark brown punctures; hemelytral membrane black.

Ventral coloration: Venter of head dark brown; rostral segments yellowish brown; prosternum dark yellow with dark brown punctures, mesosternum and metasternum brown with dark brown punctures, central area of mesosternum and metasternum dark brown; anterior and posterior lobes of metathoracic peritreme brown; abdominal sternites brown; connexiva brown; genital capsule black with pubescence.

Legs: Legs dark yellow.

Structure:

Head (Fig. 13): Head broad at base, narrow at tip, wider than long, clypeus longer than paraclypei, clypeus protruding anteriorly, clypeus and paraclypei fused, length of anteocular region same that of remainder of head; antenniferous tubercles widely separated; antennal segment I short and stout, extending beyond apex of head, segments II and III slender, cylindrical, segment IV fusiform, antennal formula $I < III < IV < II$; buccula short, not extending beyond antenniferous tubercles; rostrum short, crossing procoxae, rostral formula $IV < III < I < II$.

Thorax: Pronotum (Fig. 14) with carina, wider than long, anterior angles subacute, anterior margin substraight, lateral margins little round, humeral angles not prominent, posterior margin sinuate; scutellum triangular, as long as wide; corium with costal margin anteriorly substraight, posteriorly round; ostiolar peritreme (Fig. 15) triangular, producing posteriorly; evaporative area reaching more than halfway toward lateral side, not reaching to posterior side, anteriorly prominent and posteriorly round.

Abdomen: Hemelytral membrane reaching above last abdominal segment; lateral margins of connexiva rounded; margins of lateral sides of sternum sinuate; ventroposterior margin of abdominal sternite VII concave (Fig. 16).

Legs: Femora of proleg much thickened with a long thick spine, femora of mesoleg and metaleg less dilated, tibiae and tarsi slender, cylindrical, hair on tibiae of each leg.

Male genitalia: Pygophore (Figs. 20) spherical with anterior margin substraight, outer lateral margin substraight, anteriorly broad and posteriorly narrow, posterior margin round with medially narrow apex, short hair on posterior region, in lateral view anterior margin subround;

paramere (Fig. 21) with stem squarish, inner projection triangular with substraight apex, outer projection triangular, narrower than inner projection, long hair on outer projections, blade long and curved tapering with subround apex, inner and outer margins round; aedeagus (Fig. 22) with phallosoma broad, conjunctiva without any lobe, ejaculatory reservoir complete, attached to squarish body, wings squarish, a pair of holding sclerites present, vesica broad, gonoporal process long and broad with many coils.

Measurements (in mm): Head length: 1.00; width across eyes: 1.25; length of anteocular region: 0.50; length of remainder head: 0.50; interocular space: 0.70; interocellar space: 0.50; length of antennal segments I: 0.475, II: 1.07, III: 0.90, IV: 1.00; length of labial segments I: 0.75, II: 0.85, III: 0.60, IV: 0.35; pronotum length: 1.75, width at posterior margin: 2.25; scutellar length: 1.40; width: 1.40; length base scutellum to apex clavus: 2.12; claval commissure: 0.60; length of corium: 3.40; length of hemelytra: 4.75; width of membrane: 1.85; length apex scutellum to apex abdomen including membrane: 3.25; maximum width of abdomen: 2.30; total body length: 6.60.

FEMALE:

Coloration: Coloration similar to male except connexival segments VIII and IX black; genital plate black.

Structure: Abdominal sternite VII medially divided, ventroanterior margin of abdominal sternite VII forming inverted V shape structure (Fig. 17).

Female genitalia: (Fig. 18) 1st gonocoxa elongate and triangular, 1st gonapophysis narrow with subacute apex, 8th paratergite almost squarish with outer and inner margins sinuate, 9th paratergite squarish with round lateral margins; (Fig. 19) spermathecal bulb short and round with outer margin round, median apical projection round, duct highly coiled divided in to three parts 1st part narrow and long, 2nd part spring like, 3rd part with straight tube.

Measurements (in mm): Head length: 1.10; width across eyes: 1.25; length of anteocular region: 0.50; length of remainder head: 0.50; interocular space: 0.75; interocellar space: 0.50; length of antennal segments I: 0.475, II: 1.00, III: 0.95, IV: 1.25; length of labial segments I: 0.75, II: 0.85, III: 0.60, IV: 0.35; pronotum length: 1.80, width at posterior margin: 2.50; scutellar length: 1.50; width: 1.50; length base scutellum to apex clavus: 2.10; claval commissure: 0.75; length of corium: 3.85; length of hemelytra: 5.00; width of membrane: 1.75; length apex scutellum to apex abdomen including membrane: 3.50; maximum width of abdomen: 2.60; total body length: 7.00.

Morphological variations: Head black; antennae black; punctures more numerous; abdominal sternites dark brown; legs light yellow; apex of tarsi black; size of male varies from 6.60 mm-8.00 mm and female varies from 6.50 mm- 7.00 mm.

Material examined: Uttarakhand: Dehradun, 23-25.VI.2010- 24 ♀♀ 5 ♂♂.

Distribution: India: Himachal Pradesh and Uttarakhand.

Remarks: This species is found in abundance from ground vegetation under leaf litter. It is a seed eater bug and is very similar to *kangricus* but differs in the shape of pronotum. It was proposed in the genus *Aphanus* by Kirkaldy, but later on shifted by Scudder. One new locality i.e. Uttarakhand has been added as earlier it was reported from Himachal Pradesh only.

List of abbreviations used

AM: Anterior Margin, B: Blade, BP: Basal Plate, C: Conjunctiva, ER: Ejaculatory Reservoir, Fig.: Figure, Gnp: Gonapophysis, GP: Gonoporal Process, Gx: Gonocoxa, HS: Holding Sclerite, mm: Millimeters, MP: Median Projection, OM: Outer Margin, P: Pivot, PM: Posterior Margin, Pt: Paratergite, R: Ramus, SB: Spermathecal Bulb, SD: Spermathecal Duct, St: Stem, T: Theca, V: Vesica, W: Wing.

REFERENCES

- Ashlock P.D. (1957) An investigation of the taxonomic value of the phallus in the Lygaeidae (Hemiptera: Heteroptera). *Annals of Entomological Society of America*, 50: 407-426.
- Scudder G.G.E. (1959) The female genitalia of the Heteroptera: Morphology and bearing on classification. *Trans. Royal Entomological Society London*, 3: 405-465.
- Scudder G.G.E. (1962) The world Rhyparochromidae (Hemiptera: Lygaeidae) II. New genera for previously described species. *Canadian Entomologist*, 94(9): 981-989.
- Scudder, G.G.E. (1967) Rhyparochrominae types in the British Museum (Natural history) (Hemiptera: Lygaeidae). *Bulletin of British Museum (Natural History)Entomology*, 20(6): 251-285.

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