



## ***Tropiorhynchus annandalei* (Coleoptera: Scarabaeidae: Rutelinae), a new species from Maharashtra, India**

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### **Abstract**

*Tropiorhynchus annandalei* new species (Coleoptera: Scarabaeidae: Rutelinae: Anomalini: Anisopliina) from Bhimshankar Wildlife Sanctuary, Pune district, Maharashtra State, India is described, diagnosed, and illustrated. The new species is compared with all its congeners: *Tropiorhynchus orientis* (Newman, 1838), *T. podagricus* (Burmeister, 1844), and *T. umbrinus* Machatschke, 1954. The newly described species differs from all its congeners by the unique structure of aedeagus, sculpturing of pronotum, medially smooth pygidial surface, and elytral markings. An illustrated key to the species of the genus *Tropiorhynchus* Blanchard, 1851 is also provided.

**Key words:** Anomalini, Anisopliina, diversity, oriental region, taxonomy

### **Introduction**

The genus *Tropiorhynchus* Blanchard, 1851 (Coleoptera: Scarabaeidae: Rutelinae: Anomalini: Anisopliina) contains only three species: *T. orientis* (Newman, 1838), *T. podagricus* (Burmeister, 1844), and *T. umbrinus* Machatschke, 1954 (Arrow 1917; Machatschke 1954; Krajcik 2007; Zorn 2006). The genus *Tropiorhynchus* was established by Blanchard (1851) for *Tropiorhynchus orientis* and *T. podagricus*, which were previously in the genus *Anisoplia* Schönherr, 1817. Later Arrow (1917) provided a detailed description and distribution of *T. orientis* and *T. podagricus* from the Indian subcontinent and designated *T. orientis* as the type species of the genus. Machatschke (1954) revised this genus and based on the elytral pattern and the shape of aedeagus, and described an additional species, *T. umbrinus* from Khandala (Bombay). The information on the distribution of the species in this genus is fragmentary. *Tropiorhynchus orientis* is known from the northern Himalayas of Sikkim and Himachal Pradesh (Shimla) to southern Karnataka (Belgaum, Kanara) and was also recorded from Baluchistan (Chaman) (Arrow 1917; Machatschke 1954; Zorn 2006). *Tropiorhynchus podagricus* has been reported from Jammu and Kashmir and Maharashtra States, and *T. umbrinus* is only known from Maharashtra State (Arrow 1917; Machatschke 1954).

While working the Rutelinae collection in the Zoological Survey of India, Kolkata (ZSCI), we discovered seven specimens of a new species belonging to the genus *Tropiorhynchus*. The purpose of this paper is to describe, illustrate, and diagnose this new species. Relevant diagnostic characters (head, pronotum, elytra, legs, pygidium, and aedeagus) of the new species and previously known species of this genus are illustrated and compared (see Table 1; Figs. 1–54). The previously known species of this genus were compared with the materials deposited in the National Zoological Collection of the Zoological Survey of India, Kolkata (NZSI) and identified with the help of descriptions and illustrations in Newman (1838), Burmeister (1844), Arrow (1917), and Machatschke (1954).

### **Material and methods**

The material of the new species was collected at Bhimashankar Wildlife Sanctuary, Pune district, Maharashtra

State, India during a survey documenting the fauna of Maharashtra, India. The specimens are dry and pinned. The aedeagus was dissected and kept in 10% KOH for 30 minutes to clear the hard sclerotized structures. The specimens were studied using a Leica M205A stereomicroscope. The measurements and photographs were taken through the microscope using the proprietary software (Leica application suite, V3.8). The distribution map was created using the free mapping and geographic data analysis software DIVA-GIS (version 7.5.0, www.diva-gis.org).

### ***Tropiorhynchus annandalei* Gupta & Chandra, new species**

(Figs. 4–5, 9, 13, 17, 21, 31–33, 36, 40, 44, 48, 52, 53)

**Type locality.** India, Maharashtra state, Pune district, Bhimashankar Wildlife Sanctuary, 19.1319°N, 73.5538°E.

**Type material (7 specimens).** Holotype, male: “India, Maharashtra state, Pune district, Bhimashankar Wildlife Sanctuary, 19.1319°N, 73.5538°E, 1.xi.2012, collected by K. Chandra and Bulganin Mitra” (ZSCI registration number: 22708/H4A). Paratypes (5 males, 1 female): same data as holotype (ZSCI registration number: 22709/H4A to 22714/H4A). The specimens bear a red printed label: “*Tropiorhynchus annandalei* sp. nov., HOLOTYPE [or PARATYPE], Devanshu Gupta & Kailash Chandra det. 2016”.

**Type depository.** All the type specimens are deposited in the collection of Zoological Survey of India, Kolkata (ZSCI).

**Description** (holotype, male). **Size.** Length from clypeus to pygidium: 12.0 mm, width across humeri: 5.4 mm.

**Shape.** Elongate and parallel sided.

**Colour.** Head, pronotum, and legs green; pygidium greenish black; elytra yellow with brownish-black markings, elytral suture entirely black. Elytral intervals 1 and 2 with a transverse band in middle and at end, elytral interval 3 brownish black with small yellow area in middle and at base, elytral interval 4 dark brownish black with a yellow strip present after interval 4; lateral sides entirely brownish black; setae white.

**Head** (Fig. 9). Surface densely rugose, anterior portion smooth. Clypeus at apex rounded, at mid-disc with longitudinal ridge, not reaching to frontoclypeal suture. Frontoclypeal suture slightly curved in middle; frons rugopunctate, punctures fine at posterior portion; a group of white setae arising near margin of eyes.

**Pronotum** (Fig. 13). Surface finely punctate; punctures saucer shaped, fine, not densely packed; edges of punctures near anterior portion not merged. Surface near base medially smooth; anterior angles pointed, posterior angles rounded, lateral sides rounded, side at base weakly sinuate. Posterior margin beaded, bead vanishing medially; a group of setae present at anterior angle, in middle and at posterior angle.

**Elytra** (Fig. 17). Striae punctate; intervals convex and smooth, intervals 1 and 2 broad; stria 1 reaching to posterior margin, other striae vanishing before reaching posterior margin.

**Scutellum** (Fig. 17). Traingular, broad at tip, surface finely punctate.

**Pygidium** (Fig. 21). Strongly arched and convex, medially smooth, laterally rugose.

**Venter.** Surface densely setose, setae white; mesosternum not produced.

**Legs** (Figs. 31–33, 36, 40, 44). Protibiae bidentate, tibial teeth near apex. Longer claw of protarsi and mesotarsi spilt apically (Figs. 36, 40); metatarsal claws simple (Fig. 44); meso- and metatrochanter with sharp tooth (Figs. 32, 33); tooth on protrochanter absent (Fig. 31).

**Aedeagus** (Figs. 48, 52). Parameres nearly straight (in lateral view); apex of parameres blunt, and markedly separated (in frontal view) (Fig. 48); ventral plate nearly straight without a raised lamina in middle; apex of ventral plate without a hooked process (Fig. 52).

**Female (paratype)** (Fig. 53). Differs from male in elytra rather broad, surface yellow, comparatively less-developed elytral markings, legs comparatively short, metafemora broad, metatrochanter with less-developed spines.

**Collecting circumstances.** Handpicked from grasses (Fig. 53).

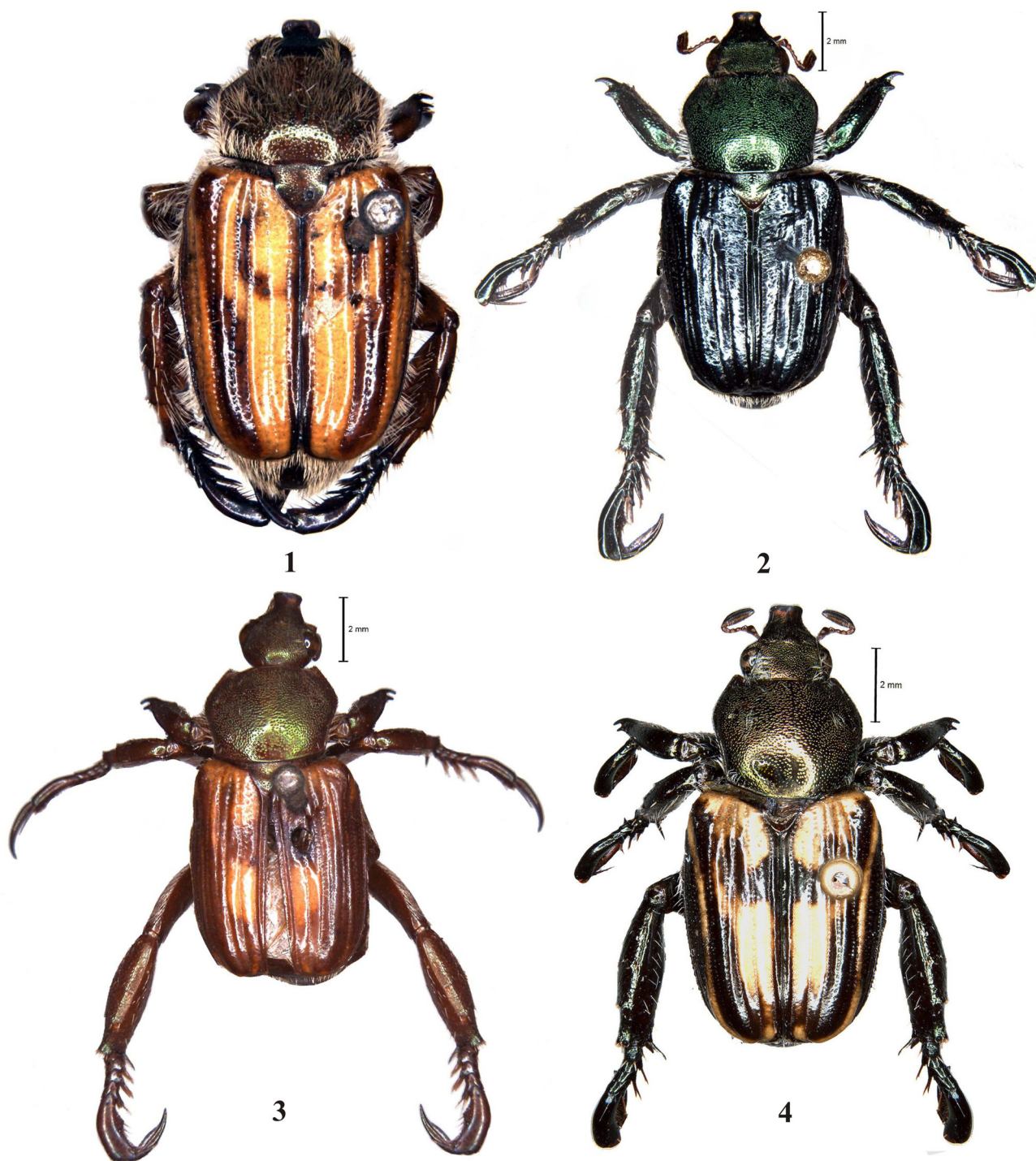
**Distribution:** Only known from type locality (Fig. 5).

**Etymology.** The species is named in the honor of Dr. Thomas Nelson Annandale, founder Director of Zoological Survey of India, Kolkata.

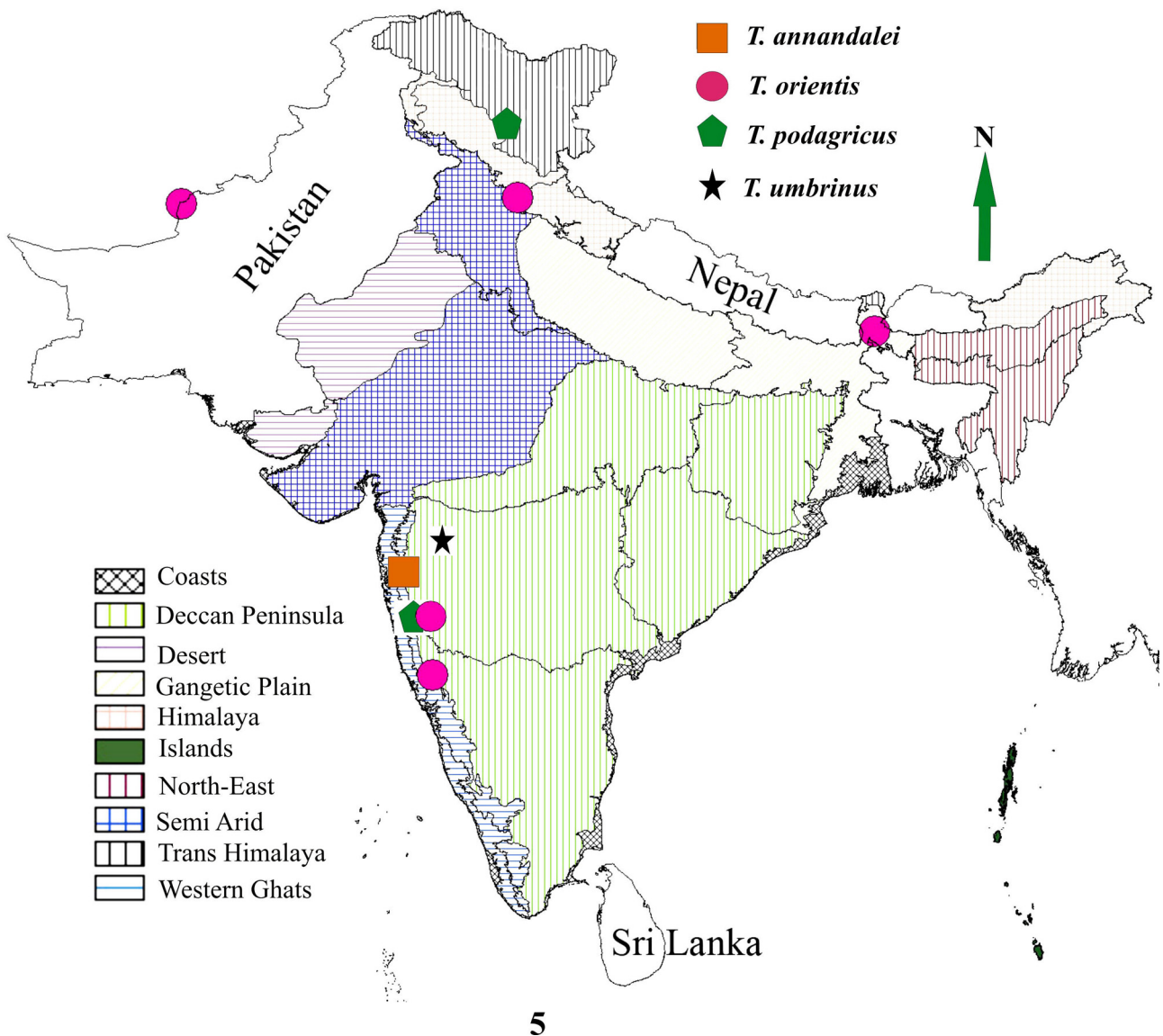
**Differential diagnosis.** *Tropiorhynchus annandalei* is distinguished by the unique structure of aedeagus, elytral markings, medially smooth and laterally rugose pygidial surface, and tooth on protrochanter nearly absent.

The new species belongs to the genus *Tropiorhynchus* based on the following set of diagnostic characters: clypeus produced into a truncate rostrum; pronotum broadly transverse, more-or-less setose; pygidium convex; protibiae bidentate, teeth sharp; mesotibiae and metatibiae narrowing slightly towards apex, scarcely spinose; tarsal claws long, slender, and unequal; mesosternum not produced beyond mesocoxae.

The new species is similar to *T. podagricus* and *T. umbrinus* as it has a clypeus with a longitudinal ridge in middle; pronotum with setae present only near anterior margin, anterior angles acute, posterior angles blunt, lateral side at posterior margin straight; and mesosternum not produced.



**FIGURES 1–4.** Habitus, male dorsal view. 1, *Tropiorhynchus orientis*; 2, *T. podagricus*; 3, *T. umbrinus*; 4, *T. annandalei* (holotype).



**FIGURE 5.** Map of India and adjacent countries showing distribution of the species belonging to the genus *Tropiorhynchus*.

The new species is the only species in the genus in which the ventral plate of the aedeagus is nearly straight and without a hooked process at tip (Fig. 52). The other species of the genus exhibit a ventral plate with a hooked tip (Figs. 49–51). Furthermore, *T. orientis* exhibits an anteriorly straight ventral plate with a raised lamina in middle and tip with a small pointed hook (Fig. 49). As discussed by Machatschke (1954), the ventral plate in *T. podagricus* is strongly curved with its tips pointed (Fig. 50) whereas in *T. umbrinus*, the ventral plate is filamentous, slightly curved with the tip strongly pointed and beak shaped (Fig. 51). See Table 1 for the identification of *T. annandalei*, *T. orientis*, *T. podagricus*, and *T. umbrinus*.

***Tropiorhynchus orientis* (Newman, 1838)**

(Figs. 1, 5–6, 10, 14, 18, 21–24, 34, 37, 41, 45, 49)

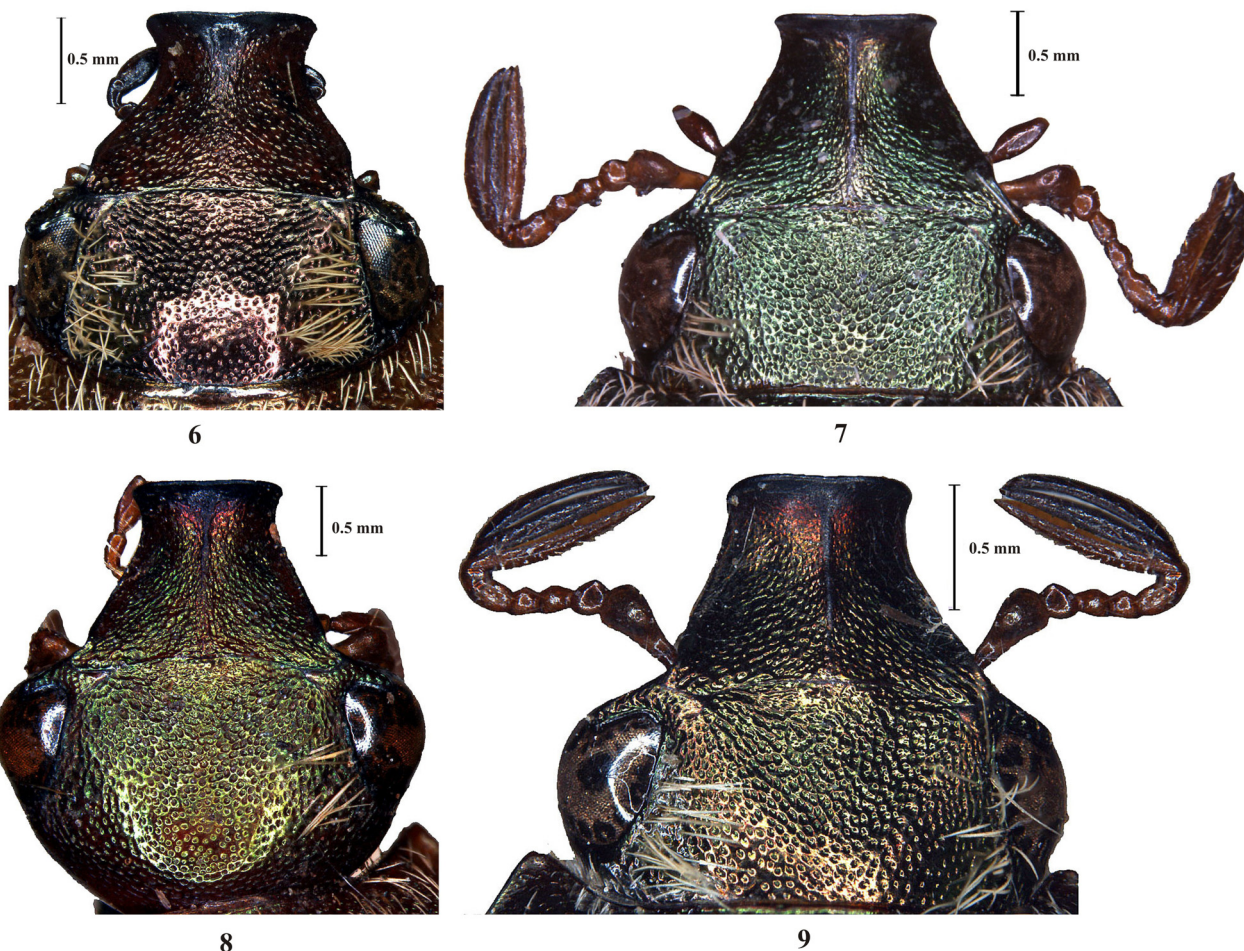
*Anisoplia orientis* Newman, 1838: 384; Burmeister 1844: 226.

*Tropiorhynchus orientis*: Blanchard 1851: 176; Arrow 1917: 54, plate 1, fig. 2 (habitus, male); Machatschke 1954: 64, fig. 1b (lateral side of pronotum), fig. 2b (metathoracic leg); 6a–b (frontal view paramere, lateral view aedeagus), fig. 7 (endophallus); Machatschke 1972: 254.

**Material examined.** India, Himachal Pradesh, North Kanara district, Castle Rock, 2 males, 2 females, 11–26.x.1916, S. Kemp (ZSCI registration number: 5461/H1 to 5464/H1).

**Distribution** (Fig. 5). India: Sikkim (Darjeeling and Kurseong), Karnataka (Belgaum, Kanara), Maharashtra (Bombay), and Himachal Pradesh (Shimla). Elsewhere: Baluchistan (Chaman) (Machatschke 1954).

**Remarks.** The original description of this species (Newman 1838) is short though it includes several diagnostic morphological characters revealing its identity such as head, pronotum, and scutellum rugopunctate and setose, with green and bronze colouration; and elytra deeply striate, striae rugopunctate. Arrow (1917) differentiated this species from *T. podagricus* by the presence of produced mesosternum, densely setose pronotum, and apically split outer protarsal claw. Thorough examination of all the congeners revealed that produced mesosternum and apically split outer claw of protarsus are species specific characters, which are not found in any other species of the genus. Moreover, the aedeagus in this particular species is unique with the ventral plate having a raised lamina medially (see Machatschke 1954: figs. 6a–b). The aedeagal structure in the specimen we observed (Figs. 45, 49) is identical to the illustrations provided by Machatschke (1954: figs. 6a–b).



**FIGURES 6–9.** Head. 6, *Tropiorhynchus orientis*; 7, *T. podagricus*; 8, *T. umbrinus*; 9, *T. annandalei* (holotype).

***Tropiorhynchus podagricus* (Burmeister, 1844)**

(Figs. 2, 5, 7, 11, 15, 19, 25–27, 35, 38, 42, 46, 50, 54)

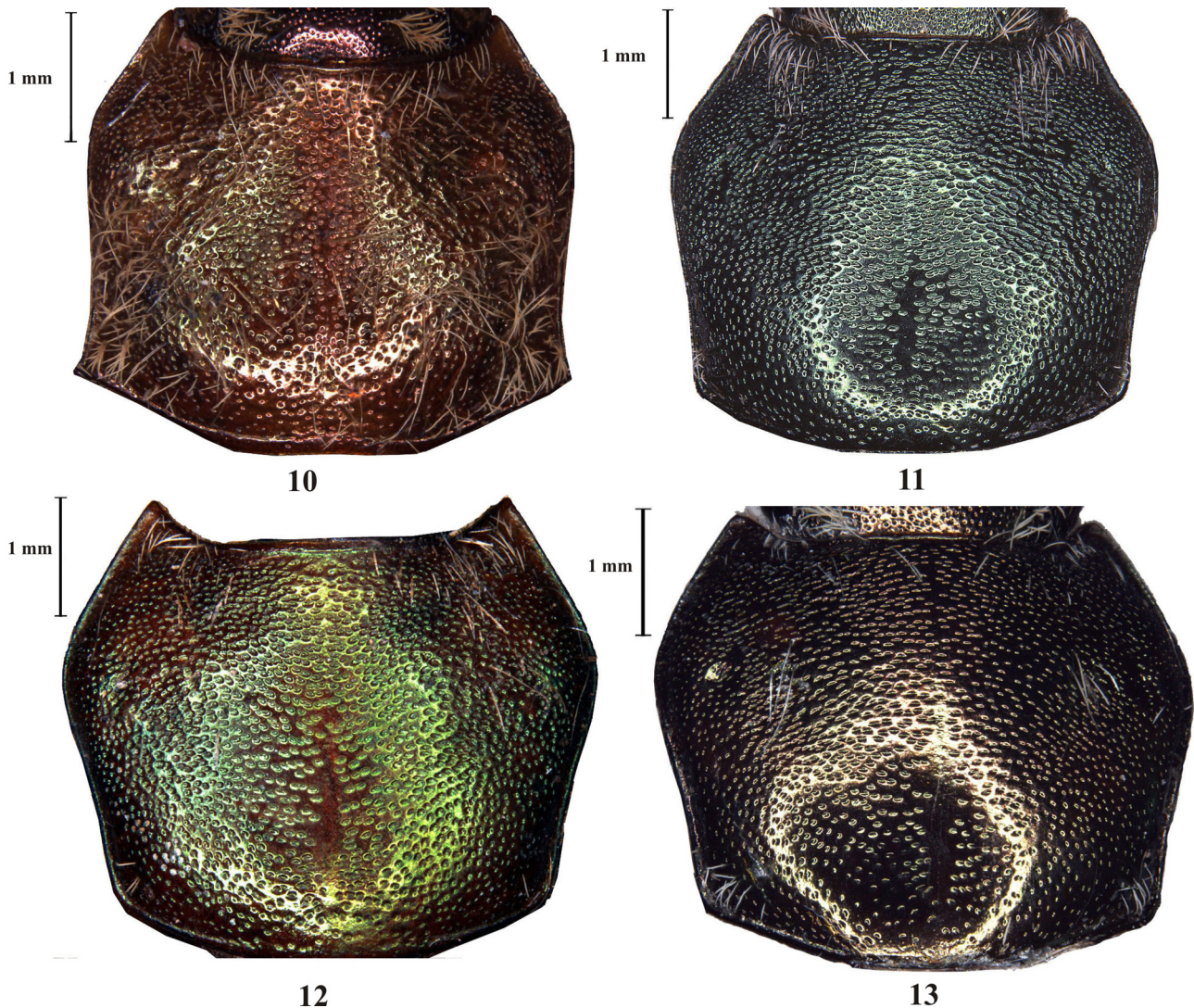
*Anisoplia podagricus* Burmeister, 1844: 226.

*Tropiorhynchus podagricus*: Blanchard 1851: 176; Arrow 1917: 55; Machatschke 1954: 60, figs. 1, 3a–b (frontal view paramere, lateral view aedeagus); Machatschke 1972: 254; Jameson *et al.* 2007: 430, fig. 11 (habitus, dorsal view).

**Material examined.** India, Maharashtra State, Satara District, Kass Valley, 7 males, 1 female, collected, K. Chandra and B. Mitra (ZSCI registration number: 22715/H4A to 22721 /H4A).

**Distribution** (Fig. 5). India: Jammu & Kashmir, and Maharashtra (Satara, Bombay: Khandala) (Machatschke 1954).

**Remarks.** Burmeister (1844) described *T. podagricus* having black and shiny elytra. It is the only species in the genus with elytra entirely black, sometimes with 2 yellow spots in middle (Figs. 15, 54), and completely lacking longitudinal markings on the dorsal surface (Arrow 1917; Machatschke 1954). The apex of parameres are blunt at the apex (in frontal view), and ventral plate of the aedeagus (in lateral view) is strongly curved (Figs. 46, 50), which identically resemble with the illustrations provided by Machatschke (1954: figs. 1, 3a–b).



**FIGURES 10–13.** Pronotum. 10, *Tropiorhynchus orientis*; 11, *T. podagricus*; 12, *T. umbrinus*; 13, *T. annandalei* (holotype).

***Tropiorhynchus umbrinus* Machatschke, 1954**

(Figs. 3, 5, 8, 12, 16, 20, 28–30, 39, 43, 47, 51)

*Tropiorhynchus umbrinus* Machatschke, 1954: 62, fig. 1b (lateral side of pronotum); fig. 2a (metathoracic leg), 4a– b, (frontal view paramere, lateral view aedeagus), fig. 5 (endophallus); Machatschke 1957: 180, plate 6, fig. 4a (habitus dorsal view, male), 4b (habitus ventral view, male), 4c (protarsi, male); Machatschke 1972: 254.

*Tropiorhynchus umbrinus* form *cruciata* (unavailable name): Machatschke 1954: 62.

*Tropiorhynchus umbrinus* form *flava* (unavailable name): Machatschke 1954: 62.

**Material examined.** India, Maharashtra State, Bombay, 1 male, (ZSCI registration number: 2416/16).

**Distribution** (Fig. 5). India: Maharashtra (Bombay, Khandala).



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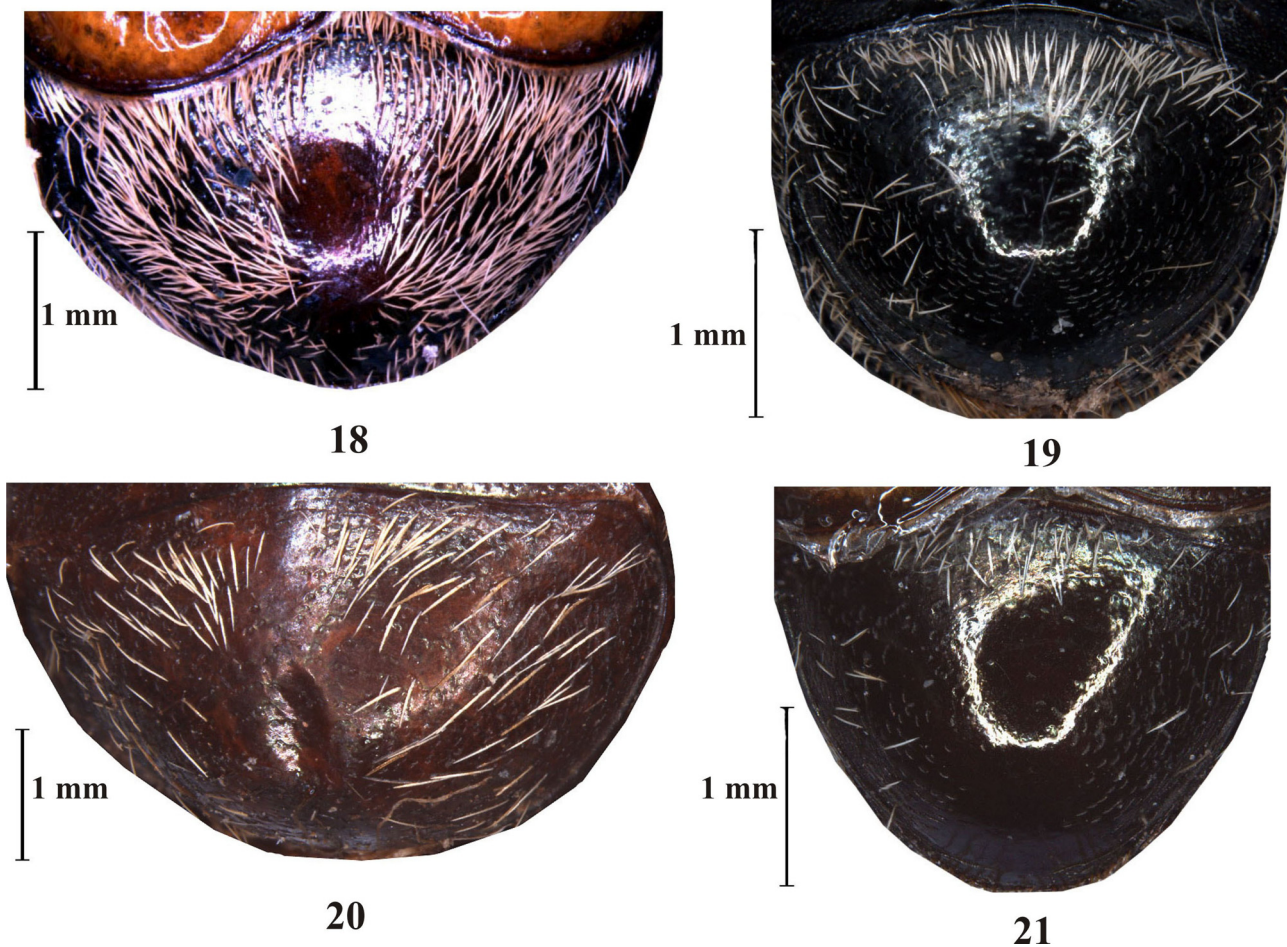


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FIGURES 14–17. Elytra. 14, *Tropiorhynchus orientis*; 15, *T. podagricus*; 16, *T. umbrinus*; 17, *T. annandalei* (holotype).



FIGURES 18–21. Pygidium. 18, *Tropiorhynchus orientis*; 19, *T. podagricus*; 20, *T. umbrinus*; 21, *T. annandalei* (holotype).

### Key to the species of the genus *Tropiorhynchus*

1. Pronotum rugose, posterior angles acute; surface of pronotal disc densely setose (Fig. 10); outer claw of protarsus split apically (Fig. 34); outer claw of mesotarsus and metatarsus simple (Figs. 37, 41); all trochanters without teeth (Figs. 22–24); mesosternum produced; ventral plate of aedeagus with a raised lamina in middle (Fig. 49) . . . . . ***T. orientis* (Newman, 1838)**
- Pronotum punctate, posterior angles blunt; surface of pronotal disc sparsely setose with a group of setae present near anterior portion of pronotum (Figs. 11–13); outer claw of protarsus and mesotarsus split apically (Figs. 35–36, 38–40), outer claw of metatarsus simple (Figs. 42–44); trochanters with or without tooth (Figs. 25–33); mesosternum not produced; ventral plate of aedeagus without raised lamina in middle (Figs. 50–52) . . . . . 2
2. Elytra black without longitudinal markings, sometimes with two yellow spots in middle (Figs. 15, 54); pronotal disc densely punctate, punctures large, edges of punctures near anterior portion of pronotum overlapping (Fig. 11); apex of parameres blunt at apex (in frontal view) (Fig. 46), ventral plate strongly curved in lateral view (Fig. 50) . . . . . ***T. podagricus* (Burmeister, 1844)**
- Elytra yellow with brownish-black markings (Figs. 16–17); pronotal disc finely punctate, punctures small, edges of punctures near anterior portion of pronotum not overlapping (Figs. 12–13); apex of parameres either pointed or blunt (in frontal view) (Figs. 47–48); ventral plate in lateral view relatively straight (Figs. 51–52) . . . . . 3
3. Punctures on pronotal disc comparatively close (Fig. 12); pygidium dark brown, finely punctate in middle, rugose at sides (Fig. 20), setae tan; ventral plate of aedeagus filamentous, slightly curved apically with a strong beak-shaped, hooked process (Fig. 51); paramere tips pointed (in frontal view) (Fig. 47) . . . . . ***T. umbrinus* Machatschke, 1954**
- Punctures on pronotal disc fine, well separated (Fig. 13); pygidium black, smooth in middle, rugose at sides (Fig. 21), setae white; ventral plate of aedeagus nearly straight, apex without hooked process (Fig. 52); paramere tips weakly pointed (in frontal view) (Fig. 48) . . . . . ***T. annandalei* Gupta and Chandra, new species**



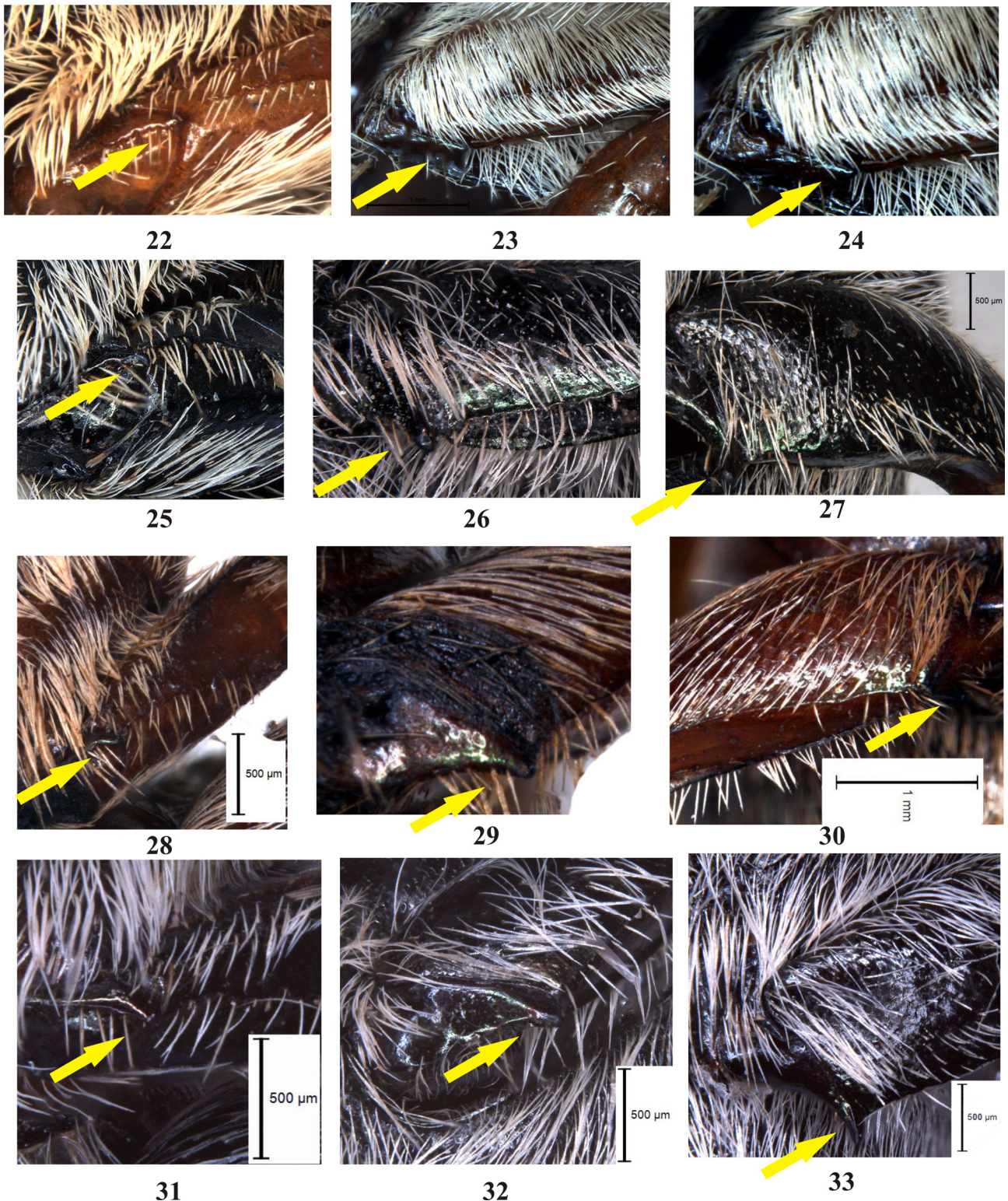
TABLE 1. Diagnostic characters separating species belonging to the genus *Tropiorhynchus*.

Species / character	<i>T. annandalei</i>	<i>T. orientis</i>	<i>T. podagricus</i>	<i>T. umbrinus</i>
<b>Head</b>				
Clypeus at mid disc with longitudinal ridge, not reaching frontoclypeal suture (Fig. 9).	Clypeus at mid-disc without longitudinal ridge (Fig. 6).	Clypeus at mid-disc with longitudinal ridge reaching frontoclypeal suture (Fig. 7).	Clypeus at mid disc with longitudinal ridge, not reaching frontoclypeal suture (Fig. 8).	
Lateral side of clypeus nearly straight (Fig. 9).	Lateral side of clypeus sinuate (Fig. 6).	Lateral side of clypeus nearly straight (Fig. 7).	Lateral side of clypeus nearly straight (Fig. 8).	
Anterolateral angle of clypeus rounded (Fig. 9).	Anterolateral angle of clypeus slightly angular (Fig. 6).	Anterolateral angle of clypeus slightly angular (Fig. 7).	Anterolateral angle of clypeus slightly angular (Fig. 8).	
Frons punctate, surface near frontoclypeal suture rugose, punctures basally fine (Fig. 9).	Frons punctate, punctures near frontoclypeal suture dense, basally fine (Fig. 6).	Frons rugopunctate, punctures basally closely packed. (Fig. 7).	Frons punctate, surface near frontoclypeal suture rugose, punctures basally fine (Fig. 8).	
Setae near eyes sparse, white (Fig. 9).	Setae near eyes dense, tan (Fig. 6).	Setae near eyes sparse, white (Fig. 7).	Setae near eyes sparse, white (Fig. 8).	
<b>Pronotum</b>				
Setae only present near anterior margin (Fig. 13).	Surface of disc and margin densely setose (Fig. 10).	Setae only present near anterior margin (Fig. 11).	Setae only present near anterior margin (Fig. 12).	
Surface punctate; punctures fine, not densely packed; edges of punctures near apex not overlapping (Fig. 13).	Surface rugose (Fig. 10)	Surface punctate; punctures deep, elongate, and densely packed; edges of punctures near apex overlapping (Fig. 11).	Surface punctate; punctures fine, not densely packed; edges of punctures near apex not overlapping (Fig. 12).	
Anterior angles acute, posterior angles blunt (Fig. 13).	Anterior and posterior angles acute (Fig. 10).	Anterior angles acute, posterior angles blunt (Fig. 11).	Anterior angles acute, posterior angles blunt (Fig. 12).	
Posterior margin lacking bead medially (Fig. 13).	Posterior margin beaded (Fig. 10).	Posterior margin lacking bead medially (Fig. 11).	Posterior margin lacking bead medially (Fig. 12).	
Lateral side at posterior margin slightly sinuate (Fig. 13).	Lateral side at posterior margin strongly sinuate (Fig. 10).	Lateral side at posterior margin straight (Fig. 11).	Lateral side at posterior margin straight (Fig. 12).	
<b>Elytra</b>				
Elytral suture black (Fig. 17).	Elytral suture black (Fig. 14).	Elytral suture black (Fig. 15).	Elytral suture brown (Fig. 16).	
General coloration yellow; intervals 1 and 2 with a transverse band in middle, interval 3 brownish black at apex leaving small yellow area in middle and at base; interval 4 entirely brownish black; a yellow strip present after interval 4, lateral sides entirely brownish black (Fig. 17).	General coloration dark yellow with brown-black markings; a dark brown strip from humerus to apex, and a crescent shaped brown marking medially on each elytron (Fig. 14).	Surface completely black, sometimes with 2 yellow spots medially (Figs. 15, 55).	General coloration dark yellow in middle with intervals dark brown at lateral sides and apex (Fig. 16).	

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TABLE 1. (Continued)

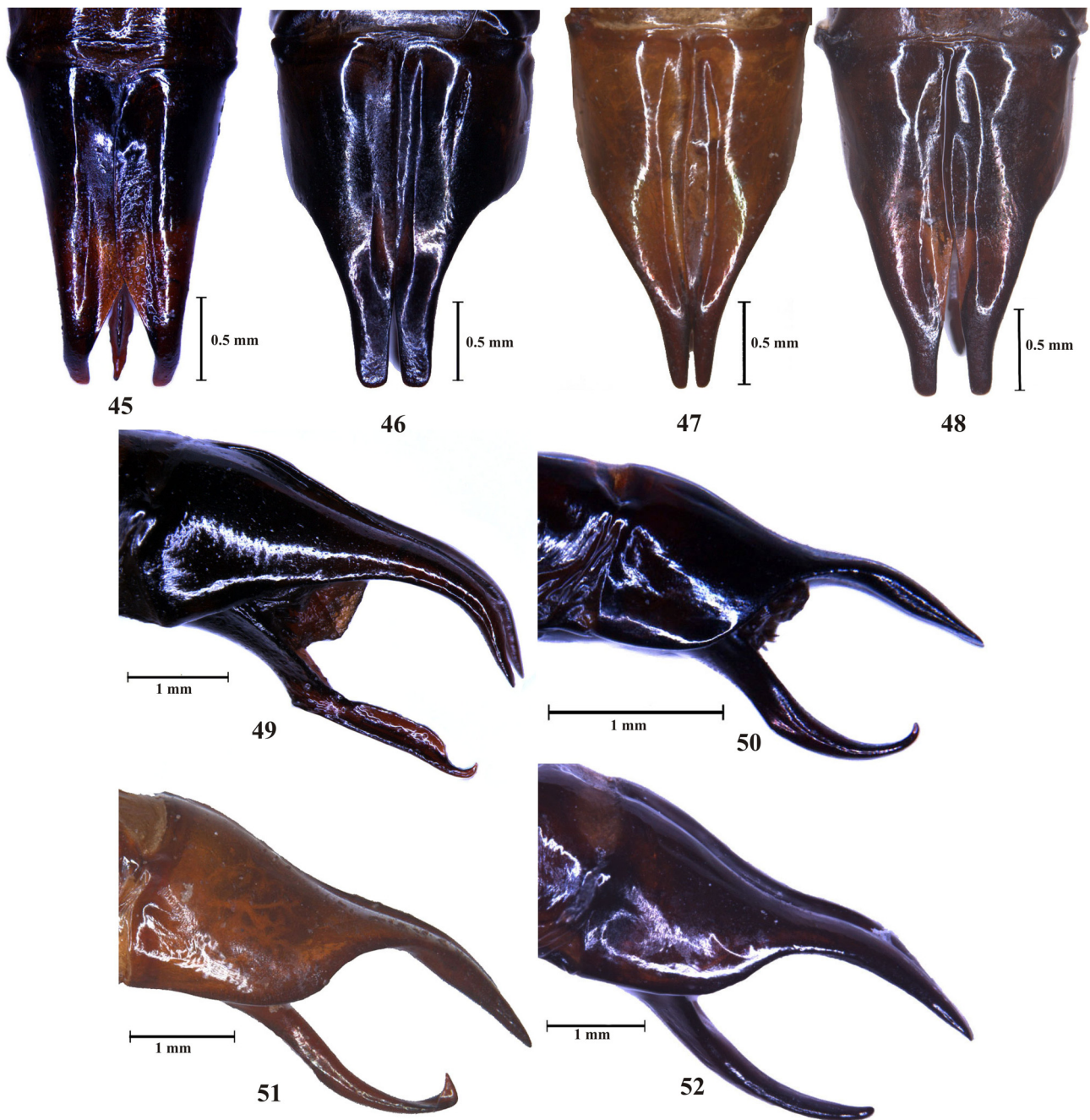
Species / character	<i>T. annandalei</i>	<i>T. orientis</i>	<i>T. podagricus</i>	<i>T. umbrinus</i>
<b>Mesosternum</b>	Not produced.	Produced.	Not produced.	Not produced.
<b>Pygidium</b>	Shiny black (Fig. 21).	Brown (Fig. 18).	Shiny black (Fig. 19)	Dark brown (Fig. 20).
	Surface smooth medially, rugose at sides (Fig. 21).	Surface smooth in middle, rugose at sides (Fig. 18.)	Surface uniformly rugose (Fig. 19).	Surface punctate medially, rugose at sides (Fig. 20).
	Sparsely setose at sides, setae white (Fig. 21).	Densely setose at sides, setae tan (Fig. 18).	Sparsely setose at sides, setae white (Fig. 19).	Sparsely setose at sides, setae tan (Fig. 20).
<b>Legs</b>	Outer claw of both protarsus and mesotarsus split apically; metatarsus simple (Figs. 36, 40, 42).	Outer claw of protarsus split apically, mesotarsus and metatarsus simple (Figs. 34, 37, 41).	Outer claw of both protarsus and mesotarsus split apically; metatarsus simple (Figs. 35, 38, 42).	Outer claw of both protarsus and mesotarsus split apically; metatarsus simple (Figs. 39, 43).
	Tarsal claws unequal; inner tarsal claws relatively smaller than in <i>T. orientis</i> (Figs. 36, 40, 44).	Tarsal claws unequal; inner tarsal claws relatively longer than other species (Figs. 34, 37, 41).	Tarsal claws unequal; inner tarsal claws relatively smaller than in <i>T. orientis</i> (Figs. 35, 38, 42).	Tarsal claws unequal; inner tarsal claws relatively smaller than in <i>T. orientis</i> (Figs. 39, 43).
	Mesotrochanter and metatrochanter with a sharp tooth (Fig. 22); tooth on protrochanter absent (Figs. 31–33).	Protrochanter, mesotrochanter, and metatrochanter without teeth (Figs. 22–24).	Protrochanter, mesotrochanter, and metatrochanter with a sharp tooth (Figs. 25–27).	Mesotrochanter and metatrochanter with a sharp tooth; tooth on profemur feeble (Figs. 28–30).
<b>Venter</b>	Densely setose, setae white.	Densely setose, setae tan.	Densely setose, setae white.	Densely setose, setae yellow.
<b>Aedeagus</b>	Parameres nearly straight (in lateral view) (Fig. 52).	Parameres bent downwardly (in lateral view) (Fig. 49).	Parameres nearly straight (in lateral view) (Fig. 50).	Parameres nearly straight (in lateral view) (Fig. 51).
	Apex of parameres blunt (in frontal view) (Fig. 48).	Apex of parameres blunt (in frontal view) (Fig. 45).	Apex of parameres blunt (in frontal view) (Fig. 46).	Apex of parameres pointed (in frontal view) (Fig. 47).
	Paramere apices widely separated (in frontal view) (Fig. 48).	Paramere apices widely separated (in frontal view) (Fig. 45).	Paramere apices close (in frontal view) (Fig. 46).	Paramere apices close (in frontal view) (Fig. 47).
	Ventral plate nearly straight without a raised lamina in middle (Fig. 52).	Ventral plate nearly straight with a raised lamina in middle (Fig. 49).	Ventral plate strongly curved without a raised lamina in middle (Fig. 50).	Ventral plate slightly curved filamentous without a raised lamina in middle (Fig. 51).
	Apex of ventral plate without a hooked process (Fig. 52).	Apex of ventral plate with a sharply pointed, hooked process (Fig. 49).	Apex of ventral plate with a hooked process, blunt at tip (Fig. 50).	Apex of ventral plate with a beak shaped, hooked process, pointed and bent upwardly (Fig. 51).



**FIGURES 22–24.** *Tropiorhynchus orientis*. 22, profemur; 23, mesofemur; 24, metafemur.  
**FIGURES 25–27.** *Tropiorhynchus podagricus*. 25, profemur; 26, mesofemur; 27, metafemur.  
**FIGURES 28–30.** *Tropiorhynchus umbrinus*. 28, profemur; 29, mesofemur; 30, metafemur.  
**FIGURES 31–33.** *Tropiorhynchus annandalei* (holotype) ; 31, profemur; 32, mesofemur; 33, metafemur.



**FIGURES 34–36.** Protarsus. 34, *T. orientis*; 35, *T. podagricus*; 36, *T. annandalei* (holotype).  
**FIGURES 37–40.** Mesotarsus. 37, *T. orientis*; 38, *T. podagricus*; 39, *T. umbrinus*; 40, *T. annandalei* (holotype).  
**FIGURES 41–44.** Metatarsus. 41, *T. orientis*; 42, *T. podagricus*; 43, *T. umbrinus*; 44, *T. annandalei* (holotype).



**FIGURES 45–48.** Parameres (in dorsal view). 45, *T. orientis*; 46, *T. podagricus*; 47, *T. umbrinus*; 48, *T. annandalei* (holotype). **FIGURES 49–52.** Parameres (in lateral view). 49, *T. orientis*; 50, *T. podagricus*; 51, *T. umbrinus*; 52, *T. annandalei* (holotype).

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FIGURES 53–54. Field photographs. 53, *T. annandalei* (paratype, female); 54, *T. podagricus*, male.

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