ON THE TAXONOMY OF SCARABAEINE FAUNA (COLEOPTERA: SCARABAEIDAE) OF BUXA TIGER RESERVE (BTR), WEST BENGAL, INDIA

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ABSTRACT: The present study is devoted to the systematics of 19 scarabaeine species under 6 genera recorded from Buxa Tiger Reserve, Dooars, West Bengal. The generated data is the outcome of long term faunistic investigations of the authors. The present discourse includes detail description, illustration and distributional pattern of each of the taxa. Further, keys to genera and species are also provided.

KEY WORDS: Scarabaeinae, New records, Dooars, Buxa Tiger Reserve, India.

Scarabaeinae globally is supposed to include members of 13 tribes represented by over 5,000 described species in 234 genera (Ratcliffe & Jameson 2013). Indian coprine species are now considered within the tribes Scarabaeini and Coprini. The entire perception of the taxa is from Lawrence & Newton (1995). Eventhough informations on the new world species are largely available, our knowledge with the members of the old world is still scanty and is limited to the monographic works of Arrow (1931) and Balthasar (1963). A concise knowledge on total number of species described or reported from India is not available till date. However, regional works on Indian Scarabaeinae were done by Biswas (1978a,b), Biswas & Chatterjee (1985, 1995), Biswas et al. (1997), Chatterjee & Biswas (2000a,b, 2003, 2004), Saha & Raychaudhuri (2000), Chandra (1988, 2000, 2004), Chandra & Singh (2004), Chandra & Ahirwar (2005), Chandra & Uniyal (2007), Sewak (1985, 1986, 1991, 2004a,b, 2005, 2006, 2009), Sarkar et al. (2010).

Extensive survey for the scarab beetles of Dooars (for details visit: http://en.wikipedia.org/wiki/Dooars), north Bengal saving the hilly regions was wanting till the initiatives taken in 1993 by the Entomology Laboratory, University of Calcutta. The study was confined primarily in the reserve forests of the area. In the process a total of 76 species are recorded from Buxa Tiger Reserve (for details visit: http://en.wikipedia.org/wiki/Buxa_Tiger_Reserve).

Present communication is on the detail taxonomy of the members belonging to Scarabaeini and Coprini. The taxa are considered sensu Ratcliffe & Jameson (2013).

Out of the 19 recorded species Helicopris tyraannus (Thomson) were reported as new record from the country, while Catharsius javanus Lansberge, Copris corpulentus Gillet, C. doriae Harold and C. sarpedon Harold from the state (Sarkar et al., 2010). However, the said study did not include the taxonomy.
All the species are described and illustrated hereunder. Necessary keys for the taxa, together with their distribution are also provided.

MATERIAL AND METHODS

Both extensive and intensive surveys were conducted during 1993 – 2005 in different beats under different ranges of Buxa Tiger Reserve. Field visits were made every month of each calendar year during the period of survey (except 15th June to 15th September when the forest remains closed). For collection of scarabs sweep nets, bush beating and collection in inverted umbrella, hand picking techniques were used. Several pit fall traps were laid in the collection localities of the Reserve to trap ground dwelling scarabs. Dung of various animals was also examined to make collections. In the evening hours UV light trap was used to collect nocturnal scarabs. Samples after collection were killed in chloroform and preserved in 70% alcohol in glass vials. Necessary data regarding locality, date of collection, collector’s name was noted in a note book in the field. They were then brought to the laboratory where stretching, pinning and labeling is done as per the guidelines laid down by Zoological Survey of India. Part of the male samples stored in 70% alcohol were kept separately in order to dissect out the genitalia. This was met out under the microscope with the help of very sharp scalpel, forceps, needles and brush. After dissection the genital capsule containing parameres was cleared in clove oil. The genital capsule was then boiled in 10% KOH for 5-10 minutes to remove muscles. After study, the male genitalia were preserved in a micro vial containing 70% alcohol along with the adult specimen.

The collected samples were studied under Sterozoom Binocular Microscopes Zeiss SV6, SV11 and Olympus SZ 30. Drawings were made with the aid of necessary accessories attached to the microscopes SV6 and SV11. Photographs were taken by a digital camera attached to the microscopes. All measurements are in millimeters, made with an eye piece graticule and each scale bar represents 1mm, if not otherwise mentioned.

All materials are in the collection of Entomology Laboratory, Department of Zoology, University of Calcutta, Kolkata, India.

RESULTS

Systematic account of the scarabaeine beetles of BTR is presented hereunder

Subfamily SCARABAEINAE Latreille, 1802

Key to tribes:
1. Elytra cut away behind shoulders; mid tibia with one terminal spur.................Scarabaeini
- Elytra not cut away behind shoulders; mid tibia with two terminal spurs..............Coprini

Tribe Scarabeini
Genus Gymnopleurus Illiger

_Type species:_ Ateuchus flagellatus Fabricius, 1787.
_Diagnosis:_ Body short, broad and flat; opaque; antennae 9 segmented; head broad, transverse; clypeus broad, front margin mediately notched and toothed; pronotum transverse, sides mediately angulate and convergent to front; elytra with 7 striae, 7th carinate anteriorly, sides strongly cut away behind shoulders; pygidial apex round; fore tibia tridentate with many denticles, mid and hind tibiae carinate externally and truncate at extremity, mid with 1 and hind with 2 long terminal spurs.

**Gymnopleurus sinuatus Olivier, var. assamensis Watson**

(Pl. IA, Fig. 1)


*Gymnopleurus sinuatus* var. *assamensis* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 63.

**Description:** Male

Length 16.6mm, humeral width 12 mm. Body short, broad and flat.

**Colour and markings (Pl. IA, Fig. 1a):** Dark coppery black with club of antenna yellow; opaque above and beneath.

**Head (Figs. 1a,b):** Broad; transverse; rugosely granular.

**Clypeus (Figs. 1a,b):** Broad; rugosely granular; front margin medially acutely notched forming sharp tooth on each side.

**Fronto-clypeal suture (Figs. 1a,b):** Marked by a transverse straight carina.

**Intercocular width:** 7.5 × transverse eye diameter.

**Antenna (Fig. 1c):** 9 segmented; club 0.63 × stem.

**Pronotum (Fig. 1a):** Transverse; finely and densely punctured; front angles acutely and hind angles obtusely produced; sides medially angulate and convergent to front.

**Scutellum (Fig. 1a):** Not visible from above.

**Elytra (Fig. 1a):** Finely punctate striate, punctures remote; striae 7 on each disc, 7th carinate anteriorly; intervals flat and coriaceous; sides strongly cut away behind shoulders; margins elevated; humeral and apical angles acute; humeral hump not evident, apical hump raised.

**Pygidium (Fig. 1d):** Finely and scantily punctured; sides and apex round.

**Mesosternum (Fig. 1e):** Laterally coarsely punctured, medially smooth; front margin round.

**Fore tibia (Fig. 1f):** Tridentate with many denticles; elongate and slender; terminally with a long and apically bidentate blunt spur.

**Mid and hind tibiae (Figs. 1g,h):** Carinate externally, outer edge serrate; truncate at extremity; mid with 1 and hind with 2 long terminal spurs.

**Tarsi (Figs. 1f,g,h):** 5 segmented.

**Claws (Figs. 1f,g,h):** Equal; curved internally and separately movable.

**Parameres (Figs. 1i,j):** Short, elongate; base nearly equal to apex; sides sinuate; inner margin curved; apex blunt, inner angle acute.

**Female:** Fore tibia broad, terminal spur slender and acute.

**Material examined:** 1 male, Rajabhatkhawa, 22.v.95, coll. S. Saha; 1 male, Nimati, 22.v.97, coll. S. Saha; 1 male, South Rydak, 25.v.02, coll. S. K. Sarkar; 1 male, Rajabhatkhawa, 29.iii.02, coll. S. K. Sarkar; 1 female, Nimati, 07.vi.03, coll.S. K. Sarkar.

**Distribution:** India: Karnataka, Madhya Pradesh, Maharashtra, Tamilnadu and West Bengal (Arrow, 1931; Saha & Raychaudhuri, 2000; Chandra & Ahirwar, 2005).

**Tribe Coprini**

**Key to genera:**

1. Elytra with two lateral carina.................................................................2
   - Elytra with one lateral carina..........................................................3

2. Sides of pronotum serrate and medially little angulate; fore tibia quadridentate........
   - Sides of pronotum smooth and medially round; fore tibia tridentate..........Helicopris Burmeister

3. Pronotum with a strong basal groove..............................................Copris Geoffroy
   - Pronotum without basal groove....................................................4

4. Pronotum with two medial impressions near base............................Onitis Fabricius
   - Pronotum without medial impressions near base..............................Onthophagus Latreille
Genus *Heliocopris* Burmeister

*Heliocopris* Hope, 1837, Col. Man., i, p. 23.

**Type species:** *Copris pirmal* Fabricius, 1798.

**Diagnosis:** Body broadly oval and strongly convex; shiny; antennae 9 jointed; head broad, transverse, vertex with a median horn and a short tubercle on each side of it; clypeus broad and nearly semicircular, front margin straight and reflexed; pronotum transverse, sides serrate and medially angulate; elytra with 8 striae, 7th and 8th carinate anteriorly; pygidial apex round; fore tibia quadridentate, mid and hind tibiae carinate externally and digitate at extremity.

**Distribution:** Africa and Asia (Arrow 1931; Ratcliffe & Jameson 2013; GBIF 2013).

*Heliocopris tyrannus* (Thomson)  
*(Pl. IA, Fig. 2)*

*Copris tyrannus* Thomson, 1858, Arch. Ent. ii, p.49.

*Heliocopris tyrannus* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 87.

**Description: Female**

**Length** 48 mm, **humeral width** 28 mm. Body broadly oval and strongly convex.

**Colour and markings** *(Pl. IA, Fig. 2a):* Brownish black; shiny above; venter with patches of red hairs.

**Head** *(Figs. 2a,b):* Broad; transverse; strigose in front and granulate behind; vertex with a sharp, short median horn and a short tubercle on each side of it.

**Clypeus** *(Figs. 2a,b):* Broad; nearly semicircular; completely margined; strigose; front margin straight and reflexed.

**Fronto-clypeal suture** *(Figs. 2a,b):* Marked by the horn and tubercles.

**Intercocular width** 6.16 × transverse eye diameter.

**Antenna** *(Fig. 2c):* 9 segmented; club 1.05 × stem.

**Pronotum** *(Fig. 2a):* Transverse; divided by a strong, sinuate and steep carina into anterior and posterior halves; anterior half coarsely and posterior half finely granular; front angles bluntly produced, hind angles obtuse; sides medially angulate; base margined and nearly round.

**Scutellum** *(Fig. 2a):* Not visible from above.

**Elytra** *(Fig. 2a):* Finely punctate striate; striae 8 on each disc, 7th and 8th carinate anteriorly; intervals convex and nearly smooth, sutural one raised; margins elevated; humeral angle not formed, apical angle acute; humeral and apical humps not evident.

**Pygidium** *(Fig. 2d):* Finely and scantily punctured; sides and apex round.

**Mesosternum** *(Fig. 2e):* Laterally coarsely punctured; medially smooth with a shallow depression near base.

**Fore tibia** *(Fig. 2f):* Bluntly quadridentate; terminally with a single long and blunt spur.

**Mid and hind tibiae** *(Figs. 2g,h):* Strongly carinate externally with few stout spines at outer edge; digitate at extremity; terminally with 2 long unequal spurs.

**Tarsi** *(Figs. 2f,g,h):* 5 segmented.

**Claws** *(Figs. 2g,h):* Equal; curved internally and separately movable.

**Material examined:** 1 female, Rajabhatkhawa, 04.vi.02, coll. S. K. Sarkar.

**Distribution:** India: Indonesia, Malaysia, Myanmar, West Bengal (Arrow, 1931; Sarkar et al., 2010).

Genus *Catharsius* Hope

*Catharsius* Hope, 1837, Col. Man. i, p. 21.

**Type species:** *Scarabaeus molossus* Linnaeus, 1758

**Diagnosis:** Body broad, oval and strongly convex; more or less shiny; antennae 9 jointed; head transverse; clypeus broad and semicircular, front margin round or medially little nothed and bilobed; base of pronotum completely margined, sides round; elytra with 8 striae, 7th and 8th carinate anteriorly; pygidial apex round; fore tibia tridentate, mid and hind tibiae carinate externally and digitate at extremity.

**Distribution:** Africa and Southern Asia (Arrow 1931; Ratcliffe & Jameson, 2013; GBIF 2013).
Key to species:

1. Base of pronotum medially angulate; pygidium granular.................................2
   - Base of pronotum round; pygidium minutely punctured......................*birmanensis* Lansberge

2. Head basally coriaceous; pronotum with a transverse, sinuate carina; sides of pronotum without pit..............................................................*molossus* (Linnaeus)
   - Head basally smooth; pronotum without transverse carina; sides of pronotum with pit....3

3. Head granular, vertex with a transverse raised carina; mid-longitudinal depression of pronotum shallow.........................................................*capusinus* Fabricius
   - Head rugose, vertex with an apically bidentate short horn; mid-longitudinal depression of pronotum deep.......................................................*javanus* Lansberge

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**Catharsius birmanensis** Lansberge

(Pl. IA, Fig. 3)

*Catharsius birmanensis* Lansberge, 1874, Col. Hefte, xii, p.11.

*Catharsius birmanensis* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 97.

**Description:** Male

**Length** 19.6 mm, **humeral width** 11.6 mm. Body short, oval, compact and strongly convex.

**Colour and markings** (Pl. IA, Fig. 3a): Pitchy black and more or less shiny; legs red.

**Head** (Figs. 3a,b): Transverse; granular, basally smooth; vertex medially with an erect, long slender horn just in front of eyes, little dilated behind in its basal half and gently curved at end.

**Clypeus** (Figs. 3a,b): Broad; semicircular; completely margined; weakly rugose; front margin reflexed, medially little notched and bilobed.

**Fronto-clypeal suture** (Figs. 3a,b): Marked by an oblique carina on each lateral side.

**Interocular width** 12.5 × transverse eye diameter.

**Antenna** (Fig. 3c): 9 segmented; club 1.52 × stem.

**Pronotum** (Fig. 3a): Transverse; partly granular with a short sharp conical protuberance on each side of middle at about midway of front and hind margins; surface between protuberances gently hollowed, smooth and flattened; sides gradually round; base margined and gently round.

**Scutellum** (Fig. 3a): Not visible from above.

**Elytra** (Fig. 3a): Punctate striate with the intervals smooth except near base; striae 8 on each disc, the 7th and 8th carinate anteriorly; suture with a membranous fringe apically; margins elevated; humeral angle not formed apical angle acute and produced; humeral and apical humps not evident.

**Pygidium** (Fig. 3d): Minutely and scantily punctured; sides and apex gradually round.

**Mesosternum** (Fig. 3e): Laterally minutely punctured, medially smooth with a longitudinal groove and a shallow pit near base; anteriorly bluntly and conically produced.

**Fore tibia** (Fig. 3f): Bluntly tridentate, with a single long terminal spur.

**Mid and hind tibiae** (Figs. 3g,h): Strongly carinate externally forming 2 sharp teeth; digitate at extremity; terminally with 2 long unequal, blunt spurs.

**Tarsi** (Figs. 3f,g,h): 5 segmented.

**Claws** (Figs. 3f,g,h): Equal; curved internally and separately movable.

**Parameres** (Figs. 3i,j): Long; base broad; sides straight; inner margin little curved near apex; apex conical, inner angle acute.

**Female:** Vertex of head bears a transverse median elevation, granules more dense.


**Distribution:** India: Sikkim, West Bengal; Bhutan; Myanmar (Arrow, 1931; Saha & Raychaudhuri, 2000).
Catharsius molossus (Linnaeus)
(Pl. IB, Fig. 4)
Scarabaeus molossus Linnaeus, 1758, Syst. Nat. ed. x, p. 347.
Catharsius molossus Arrow, 1931, The fauna of British India including Ceylon and Burma
(Col: Lamellicornia: Coprinae), iii, p. 94.

Description:
Length 23 mm, humeral width 13.3 mm. Body short, oval, compact and strongly convex.

Colour and markings (Pl. 1A, Fig. 4): Pitchy black and more or less opaque.

Head (Figs. 4a,b): Transverse; granular, basally coriaceous; armed with a basally dilated, recurved, apically blunt, strong and stout horn.

Clypeus (Figs. 4a,b): Broad; semicircular; completely margined; granular with the granules coalesce at regions to form strigosity; front margin medially little notched and bilobed.

Interocular width 8 × transverse eye diameter.

Antenna (Fig. 4c): 9 segmented; club 1.7 × stem.

Pronotum (Fig. 4a): Transverse; coarsely granular with a median longitudinal line and a transverse, strongly sinuate carina, the edges of which are projected into blunt processes, anteriorly sloping and depressed on each side; sides gradually round; base margined with the margin elevated and medially angulate.

Elytra (Fig. 4a): Coriaceous, with 8 longitudinal striae, 7th and 8th transformed into carinae; suture apically with a membranous fringe; margins elevated; humeral angle not formed, apical angle nearly right angle; humeral and apical humps not evident.

Pygidium (Fig. 4d): Granular; sides and apex gradually round.

Mesosternum (Fig. 4e): Both coarsely and minutely punctured; anteriorly conically produced and with a median longitudinal line.

Fore tibia (Fig. 4f): Bluntly tridentate; terminally with a single long spur.

Mid and hind tibiae (Figs. 4g,h): Strongly carinate externally forming 2 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 4f,g,h): 5 segmented.

Claws (Figs. 4f,g,h): Equal; curved internally and separately movable.

Parameres (Figs. 4i,j): Long; base broad; sides nearly straight; inner margin sinuate; apex narrow, inner angle acute.


Distribution: India: Andaman, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Sikkim, Uttarakhand, West Bengal; Sri Lanka (Arrow, 1931; Saha & Raychaudhuri, 2000; Chandra & Ahirwar, 2005).

Catharsius capusinus Fabricius
(Pl. IB, Fig. 5)
Catharsius capusinus Fabricius, 1781, Spec. Ins. i, p. 25.
Catharsius capusinus Arrow, 1931, The fauna of British India including Ceylon and Burma
(Col: Lamellicornia: Coprinae), iii, p. 99.

Description:
Length 18.6mm, humeral width 10.4mm. Body short, oval, compact and strongly convex.

Colour and markings (Pl. IB, Fig. 5): Pitchy black and more or less opaque.

Head (Figs. 5a,b): Transverse; granular, base smooth; vertex with a transverse raised carina, medially elevated into a horn like process.

Clypeus (Figs. 5a,b): Broad; semicircular; completely margined; granular with the granules coalesce at regions to form strigosity; front margin medially little notched and bilobed.
Fronto-clypeal suture (Figs. 5a,b): Marked by an oblique carina on each side, medially concealing with the carina.

Interocular width: $8 \times$ transverse eye diameter.

Antenna (Fig. 5c): 9 segmented; club $1.33 \times$ stem.

Pronotum (Fig. 5a): Transverse; medially smooth with a longitudinal shallow depression, rest granular with a tubercle at about $1/3$rd of length from the front margin and a shallow pit on each lateral side; sides gradually round; base margined with the margin elevated and angular at middle.

Scutellum (Fig. 5a): Not visible from above.

Elytra (Fig. 5a): Punctate striate, intervals smooth; striae 8 on each disc, 7th and 8th carinate anteriorly; suture apically with a membranous fringe; margins elevated; humeral angle not formed apical angle nearly right angle; humeral and apical humps not evident.

Pygidium (Fig. 5d): Granular; sides and apex gradually round.

Mesosternum (Fig. 5e): Laterally coriaceous, rest minutely punctured; midlongitudinally grooved and a shallow pit near base; anteriorly conically produced.

Fore tibia (Fig. 5f): Bluntly tridentate, with a single long terminal spur.

Mid and hind tibiae (Figs. 5g,h): Strongly carinate externally forming 2 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.

Material examined: 1 female, Rajabhatkhawa, 17.iii.03, coll. S. K. Sarkar.

Distribution: India: Bihar, Kerala, Orissa, Tamilnadu, West Bengal; Sri Lanka (Arrow, 1931; Sarkar et al., 2010).

**Catharsius javanus** Lansberge (Pl. IB, Fig. 6)


*Catharsius javanus* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 96.

Description: Male

Length 17 mm, humeral width 10 mm. Body short, broadly oval and strongly convex.

Colour and markings (Pl. IB, Fig. 6): Pitchy black except red antennae and mouth organs; opaque above and shiny beneath.

Head (Figs. 6a,b): Transverse; rugose; vertex with a basally dilated, short and apically bidentate horn.

Clypeus (Figs. 6a,b): Broad; semicircular; completely margined; granular with the granules coalesce at regions to form strigosity; front margin evenly round.

Fronto-clypeal suture (Figs. 6a,b): Marked by an oblique carina on each lateral side, medially concealing with the horn of head.

Interocular width: $4.8 \times$ transverse eye diameter.

Antenna (Fig. 6c): 9 segmented; club $1.6 \times$ stem.

Pronotum (Fig. 6a): Transverse; medially smooth with a deep longitudinal depression, rest granular with a tubercle at about $1/3$rd of length from the front margin and a shallow pit laterally on each side; sides gradually round; base margined with the margin elevated and angular at middle.

Scutellum (Fig. 6a): Not visible from above.

Elytra (Fig. 6a): Punctate striate, striae 8 on each disc, 7th and 8th carinate anteriorly; intervals smooth; suture apically with a membranous fringe; margins elevated; humeral angle not formed apical angle nearly right angle; humeral and apical humps not evident.

Pygidium (Fig. 6d): Granular, sides and apex gradually round.

Mesosternum (Fig. 6e): Laterally coarsely punctured, medially smooth with a longitudinal line and a shallow pit near base; anteriorly conically produced.

Fore tibia (Fig. 6f): Bluntly tridentate; terminally with a long spur.

Mid and hind tibiae (Figs. 6g,h): Strongly carinate externally forming 2 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 6f,g,h): 5 segmented.

Claws (Figs. 6f,g,h): Equal; curved internally and separately movable.

Parameres (Figs. 6i,j): Long; base broad; sides straight; inner margin curved; apex conical, inner angle acute.
Material examined: 1 male, Damanpur, 18.iv.02, coll. S. K. Sarkar.

Distribution: India: Assam, West Bengal; China, Indonesia, Malaysia (Arrow, 1931; Sarkar et al., 2010).

**Genus Copris Geoffroy**


**Type species:** *Scarabaeus lunaris* Linnaeus, 1758

**Diagnosis:** Body compact, convex or depressed; more or less shiny; antennae 9 jointed; head broad; clypeus semicircular, front margin medially little notched and bilobed; pronotum broad, medially with a longitudinal groove; elytra with 8 striae, 8th carinate anteriorly; pygidial apex round; fore tibia quadridentate, mid and hind tibiae carinate externally and dигitate at extremity.

**Distribution:** Africa, Asia, Europe (Arrow, 1931; Ratcliffe & Jameson, 2013; GBIF 2013).

**Key to species:**

1. Pronotum with a short conical prominence on each side of the midlongitudinal groove.....

   - Pronotum without any prominence on each side of the mid-longitudinal groove. copulentus Gillet

2. Front margin of clypeus reflexed; front angles of pronotum truncate........3

   - Front margin of clypeus not reflexed; front angles of pronotum produced...doriae Harold

3. Pronotum with a transverse sinuate carina little behind the front margin and a shallow pit laterally on each side.............................sarpedon Harold

   - Pronotum without any carina behind the front margin and without any pit laterally on each side..............................magicus Harold

**Copris corpulentus** Gillet

(Pl. IC, Fig. 7)


*Copris corpulentus* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 118.

**Description:** Male

**Length** 18.6 mm, **humeral width** 10.4mm. Body elongate, oval and moderately convex.

**Colour and markings** (Pl. IC, Fig. 7): Black and more or less shiny with the antennae, mouth organs red; venter with scanty bristles.

**Head** (Figs. 7a,b): Transverse; nearly smooth; medially with a sharp, pointed, basally dilated and backwardly curved horn.

**Clypeus** (Figs. 7a,b): Broad; semicircular; completely margined; minutely punctured; front margin reflexed, medially little notched and bilobed.

**Fronto-clypeal suture** (Figs. 7a,b): Marked by an oblique carina on each lateral side.

**Interocular width:** 10 × transverse eye diameter.

**Antenna** (Fig. 7c): 9 segmented; club 1.4 × stem.

**Pronotum** (Fig. 7a): Transverse; minutely and scantily punctured; medially grooved, narrow behind and broadly dilated in front; on each side of grove the top of declivity forms a short conical prominence; front margin steep; sides nearly round; front and hind angles obsolete; base margined and medially gently produced.

**Scutellum** (Fig. 7a): Not visible from above.

**Elytra** (Fig. 7a): Punctate striate; striae 8 on each disc, 8th carinate anteriorly; intervals slightly convex, minutely and scantily punctured; margins elevated; humeral angle not formed, apical angle acute; humeral and apical humps not evident.

**Pygidium** (Fig. 7d): Coarsely and densely punctured; sides and apex gradually round.

**Mesosternum** (Fig. 7e): Laterally minutely punctured, medially smooth with a longitudinal groove and a shallow pit near base; anteriorly bluntly and conically produced.

**Fore tibia** (Fig. 7f): Bluntly quadridentate; terminally with a single long and blunt spur.

**Mid and hind tibiae** (Figs. 7g,h): Strongly carinate externally with the hind forming 2 sharp teeth; dигitate at extremity; terminally with 2 long unequal spurs.
Tarsi (Figs. 7f,g,h): 5 segmented.
Claws (Figs. 7f,g,h): Equal; curved internally and separately movable.
Parameres (Figs. 7i,j): Long; base broad; sides sinuate; inner margin bisinuate forming a tooth near apex; apex flat, inner angle acute.
Material examined: 1 male, Cheko, 20.x.03, coll. S. K. Sarkar.
Distribution: India: Assam, Gujarat, West Bengal; Myanmar; Vietnam (Arrow, 1931; Sewak, 2009; Sarkar et al., 2010).

**Copris doriae** Harold

(Pl. IC, Fig. 8)

_Copris doriae_, Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 119.

**Description:** Male

Length 17.6 mm, **humeral width** 8.4 mm. Body short, oval and moderately convex.

**Colour and markings (Pl. IC, Fig. 8):** Black and shiny with the antennae, mouth organs red; venter with scanty red bristles.

**Head (Figs. 8a,b):** Broad; transverse; coarsely and densely punctured; vertex medially with a short, slender and recurved horn.

**Clypeus (Figs. 8a,b):** Broad; semicircular; completely margined; scantily but coarsely punctured; front margin notched medially and bilobed.

**Fronto-clypeal suture (Figs. 8a,b):** Marked medially by the horn.

**Interocular width:** 4.6× transverse eye diameter.

**Antenna (Fig. 8c):** 9 segmented; club 1.18 × stem.

**Pronotum (Fig. 8a):** Transverse; laterally coarsely punctured; medially nearly smooth with a longitudinal groove at posterior half, groove broadly dilated in front; front angles bluntly produced, hind angles obtuse; sides gradually round; front margin steep; base margined and gently produced at middle.

**Scutellum (Fig. 8a):** Not visible from above.

**Elytra (Fig. 8a):** Punctate striate; striae 8 on each disc, 8th carinate anteriorly; intervals slightly convex, minutely and scantily punctured; margins elevated; humeral angle not formed, apical angle acute; humeral and apical humps not evident.

**Pygidium (Fig. 8d):** Coarsely and scantily punctured; sides and apex gradually round.

**Mesosternum (Fig. 8e):** Laterally coarsely punctured; medially smooth.

**Fore tibia (Fig. 8f):** Bluntly quadridentate; terminally with a single long and blunt spur.

**Mid and hind tibiae (Figs. 8g,h):** Strongly carinate externally; digitate at extremity; terminally with 2 long unequal spurs.

**Tarsi (Figs. 8f,g,h):** 5 segmented.

**Claws (Figs. 8f,g,h):** Equal; curved internally and separately movable.

**Parameres (Figs. 8i,j):** Long; base broad; sides sinuate; inner margin nearly straight; apex conical, inner angle acute.

**Material examined:** 2 males, Rajabhatkhawa, 17.iii.03, coll. S. K. Sarkar.

**Distribution:** India: Assam, Manipur, West Bengal; Indonesia; Malaysia; Myanmar (Arrow, 1931; Sarkar et al., 2010).

**Copris sarpedon** Harold

(Pl. IC, Fig. 9)

_Copris sarpedon_ Harold, 1868, Col. Hefte, iv, p. 104.
_Copris sarpedon_, Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 110.

**Description:** Female

Length 16mm, **humeral width** 8.8mm. Body short, oval and highly convex.

**Colour and markings (Pl. IC, Fig. 9):** Black and very shiny with antennae, mouth organs red; venter with scanty red bristles.

**Head (Figs. 9a,b,c):** Transverse; coarsely and moderately closely punctured; medially with a short, transverse and apically bilobed horn.

**Clypeus (Figs. 9a,b,c):** Broad; coarsely punctured; semicircular; entirely margined; front margin reflexed, medially notched and bilobed.
Fronto-clypeal suture (Figs. 9a,b): Marked by an oblique carina on each lateral side.

Interocular width: 6 × transverse eye diameter.

Antenna (Fig. 9d): 9 segmented; club 1.5 × stem.

Pronotum (Fig. 9a): Transverse; coarsely and densely punctured; midlongitudinally grooved, on each side of which the punctures are fine and sparse; laterally with a shallow median pit on each side; front margin steep with a transverse sinuate carina little behind it; front angles truncate, hind angles obsolete; sides gradually round; base margined.

Scutellum (Fig. 9a): Not visible from above.

Elytra (Fig. 9a): Punctate striate; striae 8 on each disc, 8th carinate anteriorly; intervals slightly convex and minutely punctured; margins elevated; humeral angle not formed, apical angle acute; humps not evident.

Pygidium (Fig. 9e): Coarsely and densely punctured; sides and apex gradually round.

Mesosternum (Fig. 9f): Laterally coarsely and scantly punctured, medially smooth with a longitudinal posteriorly broad groove and a shallow pit near base; anteriorly bluntly and conically produced.

Fore tibia (Fig. 9g): Bluntly quadridentate; terminally with a long and blunt spur.

Mid and hind tibiae (Figs. 9h,i): Strongly carinate externally with the hind forming 2 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 9g,h,i): 5 segmented.

Claws (Figs. 9g,h,i): Equal; curved internally and separately movable.

Material examined: 1 female, Sankosh, 10.vi.03, coll. S. K. Sarkar.

Distribution: India: Arunachal Pradesh, Assam, Punjab, Uttarakhand, Uttar Pradesh, West Bengal; Nepal; Thailand (Arrow, 1931; Sarkar et al., 2010).

Copris magicus Harold

(Pl. ID, Fig. 10)


Copris magicus Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 112.

Description: Female

Length 15.4 mm, humeral width 8.2 mm. Body short, oval and strongly convex.

Colour and markings (Pl. ID, Fig. 10): Black and very shiny with antennae, mouth organs red; venter with scanty red bristles.

Head (Figs. 10a,b): Transverse; coarsely and moderately closely punctured; medially with a short, transverse and apically bilobed process.

Clypeus (Figs. 10a,b): Broad; rugose; semicircular; entirely margined; front margin reflexed, medially notched and bilobed.

Fronto-clypeal suture (Figs. 10a,b): Marked by an oblique carina on each lateral side.

Interocular width: 9 × transverse eye diameter.

Antenna (Fig. 10c): 9 segmented; club 1.33 × stem.

Pronotum (Fig. 10a): Transverse; coarsely punctured; mid-longitudinally grooved; front angles broadly truncate, hind angles obsolete; sides straight in front and strongly rounded behind; base margined and gently produced medially.

Scutellum (Fig. 10a): Not visible from above.

Elytra (Fig. 10a): Punctate striate; striae 8 on each disc, 8th carinate anteriorly; intervals convex and finely punctured; margins elevated; humeral angle not formed apical angle acute; humeral and apical humps not evident.

Pygidium (Fig. 10d): Coarsely and densely punctured; sides and apex gradually round.

Mesosternum (Fig. 10e): Nearly smooth; medially smooth with a longitudinal groove and a deep pit near front margin; anteriorly bluntly and conically produced.

Fore tibia (Fig. 10f): Bluntly quadridentate; terminally with a long, gently curved and blunt spur.

Mid and hind tibiae (Figs. 10g,h): Strongly carinate externally with the hind forming 2 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 10f,g,h): 5 segmented.

Claws (Figs. 10f,g,h): Equal; curved internally and separately movable.

Material examined: 1 female, South Rydak, 20.v.97, coll. S. Saha; 1 female, South Rydak, 22.iii.05, coll. S. K. Sarkar.
**Distribution:** India: Assam, Manipur, Nagaland, Sikkim, West Bengal; China; Myanmar; Vietnam (Arrow, 1931; Saha & Raychaudhuri, 2000; Sarkar et al., 2010).

**Genus Onitis Fabricius**

**Type species:** *Scarabaeus inuus* Herbst, 1789  
**Diagnosis:** Body elongate, more or less flat and shiny; antennae 9 jointed; head small and not very broad; clypeus elliptical and separated from ocular lobes by a carinate suture, front margin round; pronotum broad, base medially with a shallow pit on each side and angularly produced; elytra punctate striate in channels, striae 7 on each disc; pygidium flat, apex round; fore tibia quadridentate, mid and hind tibiae carinate externally and digitate at extremity.  
**Distribution:** Africa, Asia and Europe (Arrow, 1931; Ratcliffe & Jameson, 2013; GBIF 2013).

**Key to species:**

1. Head granular; pronotum with a median transverse depression on each side of middle......  

- Head rugulose; pronotum with a median transverse depression on each side of middle......

**Onitis subopacus Lansberge**

(Pl. ID, Fig. 11)  
*Onitis subopacus* Arrow, 1931, *The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae)*, iii, p. 395.  
**Description:** Male  
**Length** 19.4 mm, **humeral width** 8.4 mm. Body elongate, oval and flat.  
**Colour and markings** (Pl. ID, Fig. 11): Black and shiny, with feeble metallic lusture.  
**Head** (Figs. 11a,b): Elongate; granular; vertex medially with a short conical tubercle and a transverse carina above and a tubercle on each side of it.  
**Clypeus** (Figs. 11a,b): Elliptical; transversely rugulose; entirely margined.  
**Fronto-clypeal suture** (Figs. 11a,b): Marked by a medially interrupted transverse carina.  
**Interocular width:** 7.33 × transverse eye diameter.  
**Antenna** (Fig. 11c): 9 segmented; club 2.1 × stem.  
**Pronotum** (Fig. 11a): Transverse; coarsely and densely punctured; mid-longitudinally with a narrow, incomplete line; front and hind angles obtuse; disc with a median transverse depression on each side of middle; sides medially roughly angulate; base medially with a shallow pit on each side and angularly produced.  
**Scutellum** (Fig. 11a): Not visible from above.  
**Elytra** (Fig. 11a): Punctate striate in channels; striae 7 on each disc; intervals nearly smooth; margins elevated; humeral and apical angles acute and little produced; humeral and apical humps not evident.  
**Pygidium** (Fig. 11d): Flat; nearly smooth; apex round.  
**Mesosternum** (Fig. 11e): Nearly smooth; broad; front margin sinuate.  
**Fore tibia** (Fig. 11f): Long; quadridentate; strongly curved towards the end; terminally with a long, gently curved and blunt spur.  
**Mid and hind tibiae** (Figs. 11g,h): Strongly carinate externally forming 4 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.  
**Tarsi** (Figs. 11f,g,h): 5 segmented.  
**Claws** (Figs. 11f,g,h): Equal; curved internally and separately movable.  
**Parameres** (Figs. 11i,j): Long and narrow; sides inwardly curved near base; inner margin little curved near apex; apex conical, inner angle acute.  
**Female:** Fore tibia short; mid and hind tibiae without tooth.

Distribution: India: Andhra Pradesh, Assam, Bihar, Kashmir, Madhya Pradesh, Uttarakhand, West Bengal; Malaysia; Myanmar; Sri Lanka; Thailand (Arrow, 1931; Sarkar et al., 2010).

Onitis virens Lansberge

(Pl. ID, Fig. 12)


Onitis virens Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 396.

Description: Male
Length 21 mm, humeral width 10 mm. Body elongate, oval and flat.

Colour and markings (Pl. ID, Fig. 12): Black with feeble metallic lusture; shiny except dull elytra.

Head (Figs. 12a,b): Elongate; transversely moderately rugulose; vertex medially with a short, conical tubercle and a transverse carina above it on each side.

Clypeus (Figs. 12a,b): Elliptical; transversely rugulose; entirely margined.

Fronto-clypeal suture (Figs. 12a,b): Marked by a medially interrupted transverse carina.

Interocular width: 8.2 × transverse eye diameter.

Antenna (Fig. 12c): 9 segmented; club 2.4 × stem.

Pronotum (Fig. 12a): Transverse; coarsely and densely punctured; mid-longitudinally with a narrow, incomplete line in front and a narrow groove behind; front angles obtuse and hind angles obsolete; sides medially roughly angulate; base medially with a shallow pit on each side and angularly produced.

Scutellum (Fig. 12a): Not visible from above.

Elytra (Fig. 12a): Punctate striate in channels; striae 7 on each disc; intervals minutely punctured, sutural one elevated; margins elevated; humeral and apical angles acute and little produced; humeral and apical humps not evident.

Pygidium (Fig. 12d): Flat; finely and scantily punctured; apex round.

Mesosternum (Fig. 12e): Nearly smooth; broad; front margin sinuate.

Fore tibia (Fig. 12f): Long; quadridentate; strongly curved towards the end; terminally with a long, gently curved and blunt spur.

Mid and hind tibiae (Figs. 12g,h): Strongly carinate externally forming 4 sharp teeth; digitate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 12f,g,h): 5 segmented.

Claws (Figs. 12f,g,h): Equal; curved internally and separately movable.

Parameres (Fig. 12i,j): Long and narrow; sides inwardly curved; inner margin little curved near apex; apex conical, inner angle acute.

Female: Fore tibia short; mid and hind tibiae without tooth.


Distribution: India: Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Tamilnadu, Uttarakhand, West Bengal; China; Myanmar; Vietnam (Arrow, 1931; Saha & Raychaudhuri, 2000).

Genus Onthophagus Latreille


Type species: Scarabaeus taurus Schreber, 1759

Diagnosis: Body short, oval and usually convex; dull or shiny; antennae 9 or 8 jointed; head short; clypeus fused with the ocular lobes, front margin round or bilobed; pronotum transverse, sides medially angulate, front angles acutely or bluntly produced, hind angles obsolete; elytra punctate striate, striae 8 on each disc, 8th carinate; pygidium with a
transverse ridge parallel to base; fore tibia tridentate, mid and hind tibiae carinate externally and truncate at extremity.

**Distribution:** World-wide (Arrow, 1931; Ratcliffe & Jameson, 2013; GBIF 2013).

**Key to species:**

1. Front margin of clypeus medially bilobed.................................................................2
   - Front margin of clypeus not bilobed........................................................................5

2. Base of pronotum medially angulate..............................................................................3
   - Base of pronotum medially round.............................................................................4

3. Clypeus entirely margined; antenna 9 segmented; forehead medially provided with an acute horn ...........................................................................................................bonasus Fabricius
   - Clypeus not entirely margined; antenna 8 segmented; forehead not provided with horn...........

4. Forehead medially with an elevated process; fore tibial teeth sharp; sides of pronotum feebly sinuate..........................................................................................................dama Fabricius
   - Forehead without any elevated process; fore tibial teeth blunt; sides of pronotum round.....

5. Vertex of head bears a median tubercle; clypeus transversely rugose; fronto-clypeal suture marked by a curved carina.................................................................triceratops Arrow
   - Vertex of head bears a pair of horn; clypeus coarsely punctured; fronto-clypeal suture marked by a feeble straight carina.........................................................tragus Fabricius

6. Front margin of clypeus straight and excised; fore tibia quadridentate...........................
   - Front margin of clypeus round; fore tibia tridentate...........................................armatus Blanchard

**Onthophagus bonasus Fabricius**

(Pl. IE, Fig. 13)

*Onthophagus bonasus* Fabricius, 1775, Syst. Ent., p. 23.

*Onthophagus bonasus* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 231.

**Description:** Female

**Length** 13 mm, **humeral width** 8 mm. Body short, broadly oval, compact and strongly convex.

**Colour and markings (Pl. IE, Fig. 13):** Testaceous brown with head, pronotum except the sides and base, elytral suture and venter dark green, hairy and suffused with a metallic luster.

**Head (Figs. 13a,b):** Transverse; moderately rugose near base and sparsely granular near front; forehead medially with a short, acute and erect horn; vertex bears a pair of backwardly directed horns, bases of which little flattened and granulate, and each with a slight basal tooth at the inner edge.

**Clypeus (Figs. 13a,b):** Semicircular; rugose; entirely margined; front margin strongly reflexed, medially feebly raised and bilobed.

**Fronto-clypeal suture (Figs. 13a,b):** Marked by a medially curved carina.

**Interocular width:** 6.86 × transverse eye diameter.

**Antenna (Fig. 13c):** 9 segmented; club 0.8 × stem.

**Pronotum (Fig. 13a):** Transverse; medially granulate with a feeble longitudinal groove; rest nearly smooth; front angles acutely produced, hind angles obsolete; sides feebly sinuate near hind angles; margins raised; base medially angulate.

**Scutellum (Fig. 13a):** Not visible from above.

**Elytra (Fig. 13a):** Punctate striate; intervals with few minute and setigerous punctures; margins elevated; humeral angle not formed, apical angle acute; humps not evident.
Pygidium (Fig. 13d): Minute and setigerously punctured and bears an angulate basal carina; sides and apex gradually round.

Mesosternum (Fig. 13e): Nearly smooth; mid-longitudinally grooved and a deep pit near front margin; anteriorly produced into a long and downwardly curved median process.

Fore tibia (Fig. 13f): Long; bluntly quadridentate; terminally with a short and blunt spur.

Mid and hind tibiae (Figs. 13g,h): Strongly carinate externally with the mid forming 4 and hind forming 2 sharp teeth; truncate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 13f,g,h): 5 segmented.

Claws (Figs. 13f,g,h): Equal; curved internally and separately movable.

Material examined: 1 female, South Bholka, 09.v.97, coll. S. Saha; 1 female, Rajabhatkhawa, 29.iii.02, coll. S. K. Sarkar.

Distribution: India: Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Tamilnadu, Uttarakhando, West Bengal; Cambodia; Myanmar; Pakistan; Sri Lanka; Thailand; Vietnam (Arrow, 1931; Saha & Raychaudhuri, 2000; Chandra & Ahirwar, 2005; Sewak, 2009).

**Onthophagus falcifer** Harold (Pl. IE, Fig. 14)


Onthophagus falcifer Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 270.

Description:

Male

Length 11.25 mm, humeral width 5.37 mm. Body short, oval, and moderately convex.

Colour and markings (Pl. IE, Fig. 14): Black; dorsum opaque except pronotum, venter shiny.

Head (Figs. 14a,b): Transverse, broad; coarsely punctured near base and rugose in front; vertex bears a pair of curved, divergent and backwardly inclined horns.

Clypeus (Figs. 14a,b): Semicircular; coarsely punctured; front margin medially feebly raised and bilobed.

Fronto-clypeal suture (Figs. 14a,b): Marked laterally by an oblique carina on each side.

Interocular width: 6× transverse eye diameter.

Antenna (Fig. 14c): 8 segmented; club 0.9 × stem.

Pronotum (Fig. 14a): Transverse; very coarsely and confluently punctured except at sides; front angles bluntly produced, hind angles round; sides feebly sinuate near hind angles; margins raised; base medially sharply angulate.

Scutellum (Fig. 14a): Not visible from above.

Elytra (Fig. 14a): Punctate striate, striae 7 on each disc, 7th carinate anteriorly; intervals flat and coriaceous; margins elevated; humeral and apical angles acute; humps not evident.

Pygidium (Fig. 14d): Rugose.

Mesosternum (Fig. 14e): Medially finely and laterally coarsely punctured.

Fore tibia (Fig. 14f): Bluntly quadridentate, third smallest; terminally with a short and blunt spur.

Mid and hind tibiae (Figs. 14g,h): Carinate externally; truncate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 14f,g,h): 5 segmented.

Claws (Figs. 14f,g,h): Equal; curved internally and separately movable.

Parameres (Figs. 14i,j): Short; base broad; sides nearly straight, little projected near base and apex; inner margin angulate; apex conical, inner angle acute.

Female: Vertex of head with a transverse carina.


Distribution: India: Sikkim, West Bengal (Arrow, 1931; Saha & Raychaudhuri, 2000).
Onthophagus dama Fabricius
(Pl. IE, Fig. 15)

Onthophagus dama Fabricius, 1798, Ent. Syst. Suppl., p. 32.
Onthophagus dama Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 280.

Description: Male
Length 9.22 mm, humeral width 4.77 mm. Body short, oval, compact and convex.

Colour and markings (Pl. IE, Fig. 15): Black with head, pronotum, elytral suture and venter greenish black; shiny, elytra opaque.

Head (Figs. 15a,b): Transverse; coarsely punctured near base and front; forehead medi ally with a short, basally dilated, elevated process; vertex bears a pair of erect, outwardly curved, basally flat and dilated horns.

Clypeus (Figs. 15a,b): Semicircular; minutely punctured; front margin medi ally feebly raised and bilobed.

Fronto-clypeal suture (Figs. 15a,b): Marked laterally by oblique carina on each side and medi ally by the elevated process.

Interocular width: 6.75 × transverse eye diameter.

Antenna (Fig. 15c): 9 segmented; club 1.07 × stem.

Pronotum (Fig. 15a): Transverse; minutely and densely punctured; front angles bluntly produced, hind angles obsolete; sides feebly sinuate; margins raised; base round.

Scutellum (Fig. 15a): Not visible from above.

Elytra (Fig. 15a): Punctate striate, striae 7 on each disc, 7th carinate anteriorly; intervals flat with few minute and setigerous punctures; margins elevated; humeral angle not formed, apical angle acute; humps not evident.

Pygidium (Fig. 15d): Both coarsely and minutely punctured punctured; sides and apex gradually round.

Mesosternum (Fig. 15e): Nearly smooth.

Fore tibia (Fig. 15f): Sharply quadridentate, third smallest; terminally with a short and blunt spur.

Mid and hind tibiae (Figs. 15g,h): Carinate externally; truncate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 15f,g,h): 5 segmented.

Claws (Figs. 15f,g,h): Equal; curved internally and separately movable.

Parameres (Figs. 15i,j): Short; base broad; sides straight and acutely toothed near base and apex; inner margin angulate; apex conical, inner angle obsolete.

Female: Clypeus transversely rugose; vertex of head bears a flattened and truncate tubercle.


Distribution: India: Bihar, Karnataka, Madhya Pradesh, Maharashtra, Sikkim, Tamilnadu, Uttarakhand, West Bengal; Nepal; Bhutan; Sri Lanka (Arrow, 1931; Saha & Raychaudhuri, 2000).

Onthophagus tragus Fabricius
(Pl. IF, Fig. 16)

Onthophagus tragus Fabricius, 1792, Ent. Syst. i, p. 56.
Onthophagus tragus Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 303.

Description: Male
Length 11.25 mm, humeral width 5.37 mm. Body short, broadly oval and moderately convex.
Colour and markings (Pl. IF, Fig. 16): Black, with mouth organs and antennae yellow; smooth and shiny.

**Head** (Figs. 16a,b): Transverse and broad; finely and sparsely punctured; vertex bears a pair of long, straight, slightly compressed and backwardly inclined horns, outer edge of which toothed near tip.

**Clypeus** (Figs. 16a,b): Semicircular; finely punctured; front margin medially feebly raised and bilobed.

**Fronto-clypeal suture** (Figs. 16a,b): Marked by a curved carina.

**Interocular width**: $6 \times$ transverse eye diameter.

**Antenna** (Fig. 16c): 9 segmented; club $0.9 \times$ stem.

**Pronotum** (Fig. 16a): Transverse; finely but distinctly punctured; front angles bluntly produced, hind angles round; sides round; margins raised; base gently round.

**Scutellum** (Fig. 16a): Not visible from above.

**Elytra** (Fig. 16a): Punctate striate, striae 7 on each disc, 7th carinate anteriorly; intervals flat and minutely punctured; margins elevated; humeral angle acute, apical angle nearly right angle; humps not evident.

**Pygidium** (Fig. 16d): Finely and scantily punctured.

**Mesosternum** (Fig. 16e): Coarsely but scantily punctured.

**Fore tibia** (Fig. 16f): Bluntly quadridentate, third smallest; terminally with a short and blunt spur.

**Mid and hind tibiae** (Figs. 16g,h): Carinate externally; truncate at extremity; terminally with 2 long unequal spurs.

**Tarsi** (Figs. 16f,g,h): 5 segmented.

**Claws** (Figs. 16f,g,h): Equal; curved internally and separately movable.

**Parameres** (Figs. 16i,j): Moderately long; base broad; sides sinuate and acutely toothed near apex; inner margin sinuate; apex conical, inner angle obsolete.

**Female**: Clypeus rugose; vertex of head bears a blunt median tubercle.


**Distribution**: India: Maharashtra, West Bengal; China; Indonesia; Myanmar; Vietnam (Arrow, 1931; Saha & Raychaudhuri, 2000).

**Onthophagus triceratops Arrow**

(Pl. IF, Fig. 17)


*Onthophagus triceratops* Arrow, 1931, The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 301.

**Description**: Male

**Length** 8.6 mm, **humeral width** 4.9 mm. Body short, broadly oval and moderately convex.

**Colour and markings** (Pl. IF, Fig. 17): Black metallic, with mouth organs, antennae and tarsi reddish; smooth and shiny.

**Head** (Figs. 17a,b): Transverse, broad and angularly dilated in front of eyes; moderately coarsely and densely punctured; vertex bears a pair of basally broad and flat, inwardly strongly curved and convergent horns.

**Clypeus** (Figs. 17a,b): Gradually narrow anteriorly; moderately coarsely and densely punctured; front margin medially nearly straight and strongly reflexed.

**Fronto-clypeal suture** (Figs. 17a,b): Marked by a feeble straight carina.

**Interocular width**: $5.71 \times$ transverse eye diameter.

**Antenna** (Fig. 17c): 9 segmented; club $1.25 \times$ stem.

**Pronotum** (Fig. 17a): Transverse; finely and densely punctured; front margin medially narrowly raised; front angles bluntly produced, hind angles round; sides nearly straight and feebly sinuate near hind angles; margins raised; base medially bluntly angulate.

**Scutellum** (Fig. 17a): Not visible from above.
Elytra (Fig. 17a): Punctate striate, striae 7 on each disc, 7th carinate anteriorly; intervals flat and minutely punctured; margins elevated; humeral and apical angles acute; humps not evident.

Pygidium (Fig. 17d): Finely and irregularly punctured.

Mesosternum (Fig. 17e): Medially finely and laterally coarsely punctured.

Fore tibia (Fig. 17f): Bluntly quadridentate, third smallest; terminally with a short and blunt spur.

Mid and hind tibiae (Figs. 30g,h): Carinate externally; truncate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 17f,g,h): 5 segmented.

Claws (Figs. 17f,g,h): Equal; curved internally and separately movable.

Parameres (Figs. 17i,j): Short; base nearly equal to apex; sides straight and acutely toothed near apex; inner margin curved from base to upto 2/3rd of length; apex flat, inner angle nearly right angle.

Material examined: 2 males, Rajabhatkhawa, 22.v.95, coll. S. Saha; 1 male, Nimati, 21.v.97, coll. S. Saha.

Distribution: India: Assam, Gujarat, West Bengal (Arrow, 1931; Saha & Raychaudhuri, 2000; Sewak, 2009).

**Onthophagus armatus** Blanchard

(Pl. IF, Fig. 18)


*Onthophagus armatus* Arrow, 1931, *The fauna of British India including Ceylon and Burma* (Col: Lamellicornia: Coprinae), iii, p. 293.

Description: Female

Length 10.25 mm, humeral width 5.5 mm. Body broadly oval, compact and moderately convex.

Colour and markings (Pl. IF, Fig. 18): Black, with mouth organs and antennae yellow, tarsi reddish; smooth and shiny.

Head (Figs. 18a,b): Transverse, large and broad; coarsely and densely punctured near base and rugose in front; vertex bears a strongly elevated carinate tubercle.

Clypeus (Figs. 18a,b): Semicircular; transversely rugose; front margin mediately straight and feebly excised.

Fronto-clypeal suture (Figs. 18a,b): Marked by a curved carina.

Interocular width: 3.66 × transverse eye diameter.

Antenna (Fig. 18c): 9 segmented; club 1.13 × stem.

Pronotum (Fig. 18a): Transverse; finely and moderately closely punctured; front margin mediately narrowed; front angles bluntly produced, hind angles round; sides nearly straight and feebly sinuate near hind angles; margins raised; base mediately bluntly angulate.

Scutellum (Fig. 18a): Not visible from above.

Elytra (Fig. 18a): Punctate striate, striae 7 on each disc, 7th carinate anteriorly; intervals flat and minutely punctured; margins elevated; humeral and apical angles acute; humps not evident.

Pygidium (Fig. 18d): Finely and moderately closely punctured.

Mesosternum (Fig. 18e): Medially finely and laterally coarsely punctured.

Fore tibia (Fig. 18f): Bluntly quadridentate, third smallest; terminally with a short and blunt spur.

Mid and hind tibiae (Figs. 18g,h): Carinate externally; truncate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 18f,g,h): 5 segmented.

Claws (Figs. 18f,g,h): Equal; curved internally and separately movable.


Distribution: India: Assam, West Bengal; Indonesia; Myanmar; Philippines (Arrow, 1931; Saha & Raychaudhuri, 2000).

**Onthophagus bison** Boucomont

(Pl. IF, Fig. 19)

Onthophagus bison Arrow, 1931. The fauna of British India including Ceylon and Burma (Col: Lamellicornia: Coprinae), iii, p. 302.

Description: Female

Length 6.64 mm, humeral width 3.93 mm. Body short, broadly oval and convex.

Colour and markings (Pl. IF, Fig. 19): Black, with mouth organs yellow and venter reddish; smooth and shiny.

Head (Figs. 19a,b): Transverse; short and broad; coarsely and densely punctured; vertex bears a short conical tubercle.

Clypeus (Figs. 19a,b): Semicircular; transversely rugose; front margin round.

Fronto-clypeal suture (Figs. 19a,b): Marked by a curved carina.

Interocular width: 7.4 × transverse eye diameter.

Antenna (Fig. 19c): 8 segmented; club 1.22 × stem.

Pronotum (Fig. 19a): Transverse; closely and coarsely punctured; front angles bluntly produced, hind angles obsolete; sides feebly sinuate near hind angles; margins raised; base medially angulate.

Scutellum (Fig. 19a): Not visible from above.

Elytra (Fig. 19a): Punctate striate, striae 7 on each disc, 7th carinate anteriorly; intervals flat and finely punctured; margins elevated; humeral and apical angles acute; humps not evident.

Pygidium (Fig. 19a): Coarsely punctured.

Mesosternum (Fig. 19e): Medially smooth, laterally finely punctured.

Fore tibia (Fig. 19f): Bluntly tridentate; terminally with a short and blunt spur.

Mid and hind tibiae (Figs. 19g,h): Carinate externally; truncate at extremity; terminally with 2 long unequal spurs.

Tarsi (Figs. 19f,g,h): 5 segmented.

Claws (Figs. 19f,g,h): Equal; curved internally and separately movable.

Material examined: 1 female, South Bholka, 19.v.97, coll. S. Saha.

Distribution: India: West Bengal; Myanmar (Arrow, 1931; Saha & Raychaudhuri, 2000).

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LITERATURES CITED


PLATE 1A

Male Dorsal habitus Female Dorsal habitus Genital capsule Paronotae

**Gymnopleurus simus** Olivier var. eversench Watson

Female Dorsal habitus

**Heliceopterus saryanus*** (Thomson)

Male Dorsal habitus Female Dorsal habitus Genital capsule Paronotae

**Cimaraeus himalayensis** Lambeinge
PLATE 1 D

Female Dorsal habitus

*Coptis maculata* Harold

Male Dorsal habitus  Female Dorsal habitus  Genital capsule  Parameres

*Onitis sahocenus* Lansberge

PLATE 1 E

Female Dorsal habitus

*Onthophagus boninus* Fabricius

Male Dorsal habitus  Female Dorsal habitus  Genital capsule  Parameres

*Onthophagus fuliceps* Harold

Male Dorsal habitus  Female Dorsal habitus  Genital capsule  Parameres

*Onthophagus daina* Fabricius
Figure 1a-j. *Gymnopleurus sinuatus* Olivier, var. *assamensis* Watson: Male: a. Dorsal habitus; b. Head & Clypeus, dorsal view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws; i. Genital capsule, lateral view; j. Parameres, dorsal view.
Figure 2a-h. *Heliocopris tyrannus* (Thomson): Female: a. Dorsal habitus; b. Head & Clypeus, dorsal view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws.

Figure 3a-j. *Catharsius birmanensis* Lansberge: Male: a. Dorsal habitus; b. Head & Clypeus, lateral view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws; i. Genital capsule, lateral view; j. Parameres, dorsal view.
Figure 4a-j. *Catharsius molossus* (Linnaeus): Male: a. Dorsal habitus; b. Head & Clypeus, lateral view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws; i. Genital capsule, lateral view; j. Parameres, dorsal view.

Figure 5a-h. *Catharsius capusinus* Fabricius: Female: a. Dorsal habitus; b. Head & Clypeus, lateral view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws.
Figure 6a-k. *Catharsius javanus* Lansberge: Male: a. Dorsal habitus; b. Head & Clypeus, dorsal view; c. Head & Clypeus, lateral view; d. Antenna, lateral view; e. Pygidium, dorsal view; f. Mesosternum, ventral view; g. Fore tibia, tarsi & claws; h. Mid tibia, tarsi & claws; i. Hind tibia, tarsi & claws; j. Genital capsule, lateral view; k. Parameres, dorsal view.

Figure 7a-j. *Copris corpulentus* Gillet: Male: a. Dorsal habitus; b. Head & Clypeus, lateral view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws; i. Genital capsule, lateral view; j. Parameres, dorsal view.
Figure 8a-j. *Copris doriae* Harold: Male: a. Dorsal habitus; b. Head & Clypeus, dorsal view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws; i. Genital capsule, lateral view; j. Parameres, dorsal view.

Figure 9a-i. *Copris sarpedon* Harold: Female: a. Dorsal habitus; b. Head & Clypeus, dorsal view; c. Head & Clypeus, lateral view; d. Antenna, lateral view; e. Pygidium, dorsal view; f. Mesosternum, ventral view; g. Fore tibia, tarsi & claws; h. Mid tibia, tarsi & claws; i. Hind tibia, tarsi & claws.
Figure 10a-h. *Copris magicus* Harold: Female: a. Dorsal habitus; b. Head & Clypeus, dorsal view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws.

Figure 11a-j. *Onitis subopacus* Lansberge: Male: a. Dorsal habitus; b. Head & Clypeus, lateral view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws; i. Genital capsule, lateral view; j. Parameres, dorsal view.


Figure 19a-h. *Onthophagus bison* Boucomont: Female: a. Dorsal habitus; b. Head & Clypeus, lateral view; c. Antenna, lateral view; d. Pygidium, dorsal view; e. Mesosternum, ventral view; f. Fore tibia, tarsi & claws; g. Mid tibia, tarsi & claws; h. Hind tibia, tarsi & claws.