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Taxonomic account of *Popillia* Dejean, 1821 (Rutelinae: Scarabaeidae) of Buxa Tiger Reserve (A forest under biodiversity hot spot zone), Dooars, West Bengal, India

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Abstract

Taxonomy of *Popillia* Dejean, 1821 fauna included within the subfamily Rutelinae recorded from Buxa Tiger Reserve, Dooars, West Bengal, India are dealt herewith. The generated data is the outcome of long term faunistic investigations of the authors. Each of the species is redescribed and illustrated, supplemented by digital images. Further, keys to species are also provided.

Keywords: *Popillia*, Buxa Tiger Reserve, Dooars, India, Redescription

1. Introduction

Popillia Dejean, 1821 is a small genus within the subfamily Rutelinae and is represented by only 250 species worldwide^[1]. Several authors though reported the occurrence of these beetles throughout the globe yet a comprehensive checklist of the oriental fauna is still not available. Significant contributions to the knowledge on these beetles were chiefly of Kraatz^[2, 3], Ohaus^[4, 5], Paulian^[6], Machatschke^[7], Lin^[8], Ratcliffe^[9], Sabatinelli^[10-13], Jameson^[14], Ratcliffe *et al*^[15], Jameson *et al*^[11], Smith^[16], Limbourg^[17]. Further, a concise knowledge on the total number of species from this part of the globe is still wanting and is largely based on the monographic works of Arrow^[18, 19], Balthasar^[20] and Miksic^[21]. Information on the Indian representatives can be had from the regional works of Biswas^[22, 23], Mittal^[24, 25], Saha & Raychaudhuri^[26], Chatterjee & Biswas^[27], Sarkar *et al*^[28], Chandra^[29, 30], Chandra *et al*^[31], Chandra & Gupta^[32-34]. An updated list of the Indian members is till date not available and is therefore difficult to provide.

Though Eastern Himalaya is one of the 18 hotspots of the world and one of the three of India, the area still lacks a thorough and extensive exploration, particularly for the insect fauna. We however concentrated on Buxa Tiger Reserve (BTR), Dooars, one of the tropical forests of Eastern Himalaya and the research team is engaged in doing so since 1993. The protected area falls under the biogeographic province 7B lower Gangetic plain and occupies an area of about 759.26 sq. kms. The reserve is located between latitudes 26°30" to 26°55" North and longitudes 89°20" to 89°35" East of India (Figure 1).

An elaborate description with proper illustration of the recorded taxa are not available since Arrow^[19] and here we redescribe and illustrate the taxa nearly after a century. However, of the two recorded species, Sarkar *et al*^[28], reported *Popillia maccllellandi* Hope, 1845 as new from the state without any other detail. Present discourse is the first ever taxonomic detail of the members of *Popillia* Dejean, 1821 recorded from Buxa Tiger Reserve. The taxa are considered sensu Arrow^[19].

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Fig 1: Location map of Buxa Tiger Reserve.

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 the samples sweep nets, bush beating, hand picking and UV light trap techniques were used. 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. The collected samples were studied under Stereo zoom Binocular Microscopes Olympus SZX7 and SZX16. Drawings were made with the aid of necessary accessories attached to the microscopes. 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 Department of Agricultural Biotechnology, IRDM Faculty Centre, Ramakrishna Mission Vivekananda University, Kolkata, India.

Results and discussion

Family Scarabaeidae Latreille, 1802

Subfamily Rutelinae MacLeay, 1819

Tribe Anomalini Streubel, 1839

Sub tribe Popilliina Ohaus, 1918

Genus *Popillia* Dejean, 1821

Type species: *Popillia bipunctata* Fabricius, 1787

Diagnosis: Body short, oval and convex; shiny; labrum horizontal; antennae 9 segmented; head short; clypeus short, front margin reflexed and round at angles; pronotum weakly octagonal, sides sinuate, base trisinate and excised above scutellum; scutellum elongate; elytra punctate striate, external margins often with membranous flange; propygidium and pygidium with tuft of yellow hairs; fore tibia bi or tridentate, mid and hind tibiae carinate externally and truncate at extremity.

Distribution: Asia, America & Europe (Arrow ^[19]; Ratcliffe ^[9]; Sabatinelli ^[10-13]; Chatterjee & Biswas ^[27]; Saha & Raychaudhuri ^[26]; Ratcliffe *et al* ^[15]; Jameson ^[14]; Jameson *et al* ^[1]; Smith ^[16]; Sarkar *et al* ^[28]; Chandra & Gupta ^[32-34]).

Key to species:

1. Fore tibia bidentate; external margin of elytra with a narrow abrupt lateral flange; mesosternal process bluntly round.....*amabilis* Arrow, 1913
- Fore tibia tridentate; external margin of elytra without lateral flange; mesosternal process sharply pointed *macclellandi* Hope, 1845

Popillia amabilis Arrow, 1913

(Figure-2A, 3A-H)

Popillia amabilis Arrow, 1913: 53 ^[18].

Popillia amabilis – Arrow, 1917: 77 ^[19].

Description: ♀

Length 12.11 mm, humeral width 6.66 mm. Body short, compact, oval and little convex.

Colour and markings (Figure-2A, 3A-H): Dorsum yellowish green with clypeus, head, median part of pronotum, scutellum, pygidium and basal part of propygidium deep green with a metallic lustre; pygidium with large tuft of yellow hairs on each side of middle and few scattered at apex; venter reddish, covered with yellow hairs except median part of metasternum and abdomen; shiny.

Head (Figure 3A, B): Short; coarsely and densely punctured. Clypeus (Figure 3A, B): Short; rugose; front margin reflexed.

Fronto-clypeal suture (Figure 3A, B): Marked by a transverse curved line.

Interocular width: 3.75 x transverse eye diameter.

Antenna (Figure 3C): 9 segmented, club 1.28 x stem.

Pronotum (Figure 3A): Weakly octagonal; coarsely and densely punctured; margins elevated except above scutellum; sides strongly sinuate; base trisinate and excised above scutellum; front angles acute and little projected, hind angles obtuse.

Scutellum (Figure 3A): Elongate; triangular; smooth except few fine punctures; sides round; apex acute.

Elytra (Figure 3A): Punctate striate, striae 8 on each disc; intervals nearly smooth; sutural margin elevated near apex; external margin with a narrow abrupt lateral flange; angles acute; humps raised.

Pygidium (Figure 3D): Minutely and scantily punctured, apically smooth.

Mesosternum (Figure 3E): Medially smooth, having a strong, compressed, broad anterior process with the end bluntly round.

Fore tibia (Figure 3F): Bluntly bidentate, second nearly

obsolete; subterminally with 1 short and sharp spur.
 Mid and hind tibiae (Figure 3G, H): Carinate externally; truncate and fringed with long spines at extremity; terminally with 2 unequal spurs.
 Tarsi (Figure 3F, G & H): 5 segmented.
 Claws (Figure 3F, G & H): Unequal, with longer one of fore and mid deeply cleft.
 Material examined: 1♀, Rajabhatkhawa, BTR, 08.v.94, coll. S.Saha; 1♀, Rajabhatkhawa, BTR, 09.v.94, coll. S.Saha; 1♀, Jayanti, BTR, 11.v.94, coll. S.Saha; 1♀, Panbari, BTR, 20.v.95, coll. S.Saha; 1♀, Poro, BTR, 05.iv.02, coll. S.K.Sarkar; 1♀, Nimati, BTR, 13.iii.03, coll. S.K.Sarkar; 1♀, Barobisha, BTR, 14.iii.03, coll. S.K.Sarkar.
 Distribution: India: Assam, Manipur, Meghalaya and West Bengal; Vietnam (Arrow^[19]; Saha & Raychaudhuri^[26]).

Popillia macclellandi Hope, 1845

(Figure 2B, 4A-H)

Popillia macclellandi Hope, 1845: 8^[35].

Popillia macclellandi – Arrow, 1917: 74^[19].

Description: ♀

Length 13.8 mm, humeral width 7.8 mm. Body short, compact, oval and convex.

Colour and markings (Figure 2B, 4A-H): Dorsum brown with clypeus, head, pronotum, scutellum, pygidium, basal part of propygidium and venter deep purple with a metallic lustre, abdominal segments black; propygidium anteriorly with tuft of yellow hairs on each side of middle; venter covered with yellow hairs except median part of metasternum and abdomen; shiny.

Head (Figure 4A, B): Short; coarsely and densely punctured. Clypeus (Figure 4A, B): Short; coarsely and densely punctured; front margin reflexed and round at angles. Fronto-clypeal suture (Figure 4A, B): Marked by a transverse sinuate line.

Interocular width: 4.3 x transverse eye diameter.

Antenna (Figure 4C): 9 segmented, club 1.34 x stem.

Pronotum (Figure 4A): Weakly octagonal; medially nearly smooth, laterally coarsely punctured; margins elevated except above scutellum; sides strongly sinuate; base

trisinuate and excised above scutellum; front angles acute and hind angles obtuse.

Scutellum (Figure 4A): Elongate; triangular; smooth except few fine punctures; sides round; apex blunt.

Elytra (Figure 4A): Punctate striate, striae 8 on each disc with few punctures in rows at 2nd, 4th, 6th and 08th interval; sutural margin elevated near apex; angles not formed; humps raised.

Pygidium (Figure 4D): Rugose, apically smooth.

Mesosternum (Figure 4E): Medially smooth, having a long anterior process.

Fore tibia (Figure 4F): Bluntly tridentate, second being very short; subterminally with 1 short and sharp spur.

Mid and hind tibiae (Figure 4G, H): Carinate externally; truncate and fringed with long spines at extremity; terminally with 2 unequal spurs.

Tarsi (Figure 4F, G & H): 5 segmented.

Claws (Figure 4F, G & H): Unequal, with longer one of fore and mid deeply cleft.

Material examined: 1♀, Buxaduar, BTR, 10.ix.03, coll. S.K. Sarkar.

Distribution: India: Arunachal Pradesh, Assam, Manipur, Meghalaya and West Bengal; Vietnam (Arrow^[19]; Chandra & Gupta^[32]; Sarkar *et al*^[28]).

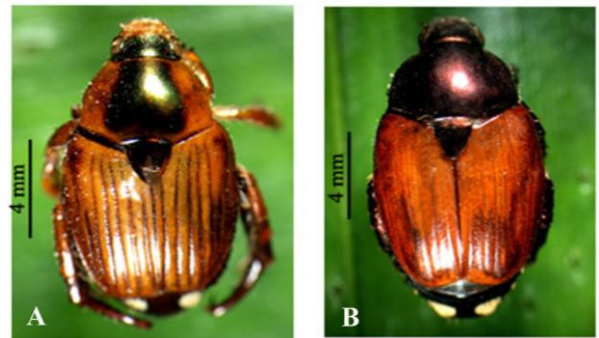


Fig 2: A. *Popillia amabilis* Arrow, 1913, ♀ Dorsal habitus; B. *Popillia macclellandi* Hope, 1845, ♀ Dorsal habitus.

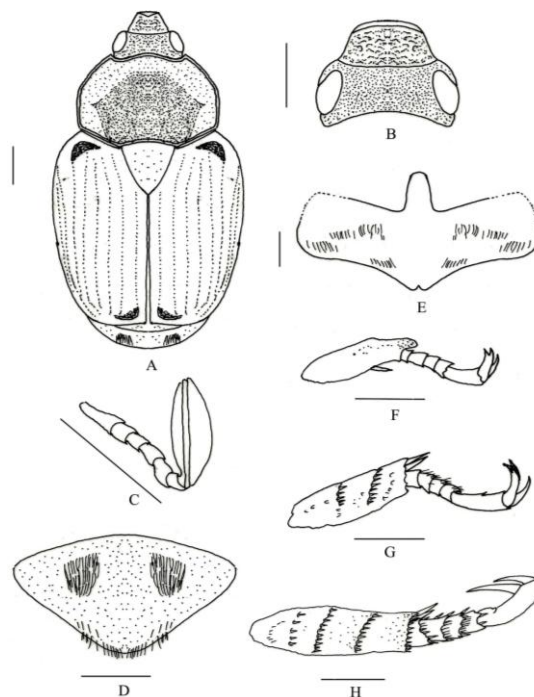


Fig 3: *Popillia amabilis* Arrow, 1913, Female: A. Dorsal habitus; B. Head & Clypeus, dorsal view; C. Antenna, lateral view; D. Pygidium, dorsal view; E. Mesosternum, ventral view; F. Fore tibia, tarsi & claws; G. Mid tibia, tarsi & claws; H. Hind tibia, tarsi & claws.

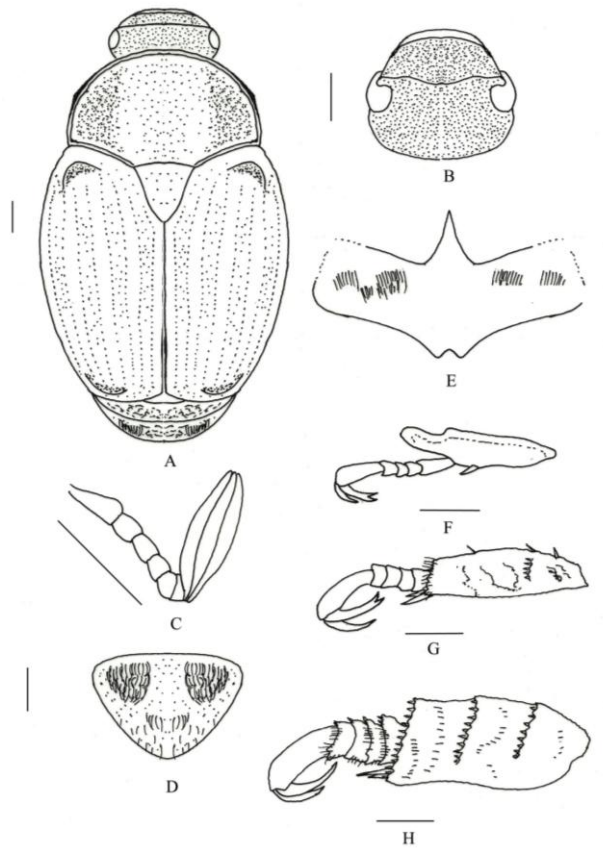


Fig 4: *Popillia macclellandi* Hope, 1845, Female: A. Dorsal habitus; B. Head & Clypeus, dorsal view; C. Antenna, lateral view; D. Pygidium, dorsal view; E. Mesosternum, ventral view; F. Fore tibia, tarsi & claws; G. Mid tibia, tarsi & claws; H. Hind tibia, tarsi & claws.

The present work is aimed to provide a first ever comprehensive taxonomic account of beetles comprising the genus *Popillia* Dejean, 1831 within the subfamily Rutelinae (Coleoptera: Scarabaeidae) occurring in Buxa Tiger Reserve. Diversity of these beetles from the area of study is so far elaborated by the two recorded species. At the species level BTR is found to be the habitat of nearly one fourth of the state fauna recorded till date, while at the level of higher taxa it is cent percent.

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