

MALE GENITALIA OF SOME NEPALESE SPECIES OF *Onthophagus* LATREILLE AND ITS TAXONOMIC IMPORTANCE

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ABSTRACT

The male genitalia of nine species of Onthophagus Latreille are described here.

INTRODUCTION

Genus *Onthophagus* Latreille is a predominant genus of the subfamily Coprinae, vastly outnumbering other genera of dung beetles in most parts of the world. These beetles are small, smooth and have compact body. These are easily recognised by absence of scutellum, elytra with one lateral carina, pronotum without a strong basal groove, and four posterior tarsi not broadly dilated.

In recent taxonomic studies of insects, the male genitalia has been considered as a good taxonomic character due to its constant nature of structure. However, the genitalia has been completely ignored by Arrow (1931) in his Fauna volume on Coprinae beetles.

MATERIALS AND METHODS

Specimens of *Onthophagus* (*pactolus* (Fabricius), *O. aenescens* (Wiedemann), *O. ramosellus* Bates, *O. sternalis* Arrow, *O. catta* (Fabricius), *O. bonasus* (Fabricius), *O. rectecornutus* Lansberge, *O. atropolitus* Orbigny, *O. sagittarius* Fabricius) were collected by the author from different forests, grass lands, rural and urban localities of Dhanusha district, Nepal from dung of the herbivorous animals primarily of cows and buffaloes.

Both preserved and freshly killed specimens were used to study the male genitalia. The dry preserved specimens were, however, relaxed in boiling water and their abdomens were treated with 10% KOH solution for few days to dissolve the soft tissues in and around the membranous and sclerotised structure of genitalia. Abdomens were dissected under stereo-binocular microscope to expose the genitalia which were then taken out with the help of forceps and mounted in Canada balsam after dehydration process only (Singh *et al.*, 1983; Sewak, 1984, 1985, 1986 and 1988).

Photographs of male genitalia were taken by German microphotographic binocular microscope and were developed in the digital colour laboratory.

OBSERVATIONS

In this study, the following parts of the male genitalia of *Onthophagus* species were considered. The male genitalia of dung beetles consist of various sclerotized and membranous parts arranged around the terminal portion of the ejaculatory duct the considered parts are as follows:

- (a) **Phallobase (Pb)**. It is proximal, long, hollow, highly sclerotized structure, forming complete ring above the parameres and aedeagus, and opens apically by wide orifice into which the ejaculatory ducts enter. At rest the phallobase contains aedeagus and parameres.

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- (b) **Paramere (Pm).** It is a paired structure and is derived from the phallic lobes. These are in continuation with the phallobase and are highly sclerotized, lateral appendages, which act like claspers during copulation.
- (c) **Aedeagus (Aed).** It is also known as phallus (Snodgrass, 1935) and is a strong, symmetrical, sclerotized median tube and functions as the main copulatory organ. It has an aedeagal apodeme on dorsal side for the attachment of muscles which act like lever for the movement of endophallus.
- (d) **Endophallus (End).** It is a muscular internal structure situated inside the phallobase; it becomes everted into the female gonopore during coitus. Thus, it is the functional intromittent organ.

The ring shaped phallobase and tubular aedeagus of male genitalia of all the recorded species in the present study showed a closer resemblance with each other while the structures of parameres and endophallus are greatly different at species level.

RESULTS

Study made on the male genitalia of *Onthophagus* species revealed the following features:

Onthophagus pactolus (Fig. 1): Parameres are rectangular in shape. Endophallus is broad and rectangular.

Onthophagus aenescens (Fig. 2): Parameres are apically pointed, spine-like and curved inward forming a forcep-like structure. Endophallus is broadened apically and narrow proximally.

Onthophagus remosellus (Fig. 3): Parameres are broad apically and pointed proximally. Inner margin is furnished with sensory bristles. Endophallus is trilobed.

Onthophagus sternalis (Fig. 4): Parameres are broad and rounded apically. Endophallus is rectangular in shape.

Onthophagus catta (Fig. 5): Parameres are broad and round apically and are furnished with sensory bristles on inner margin. The dorsal surface of parameres has a conical sclerotized structure at the middle. Endophallus is an elongated and bilobed structure; the right lobe is broad and segmented apically and narrow proximally while left lobe is tubular.

Onthophagus bonasus (Fig. 6): Parameres are broad and rounded apically and are furnished with sensory bristles on inner margin. The dorsal surface of parameres has two segmented glandular sclerotized structure at the middle. Endophallus is bilobed; right lobe is broad and rounded apically while it is narrow proximally, the left lobe is tubular.

Onthophagus rectecornutus (Fig. 7): Parameres are rectangular in shape and the lower margin is furnished with sensory bristles. The dorsal surface of the paramere has a clavate sclerotized structure at the middle. Endophallus is bilobed apically and narrow proximally.

Onthophagus atropolitus (Fig. 8): Parameres are broad and rounded apically. Endophallus is hammer - shaped.

Onthophagus sagittarius (Fig. 9): Parameres are conical shaped. Endophallus is flattened and rectangular in shape with two finger-like processes at the proximal end.

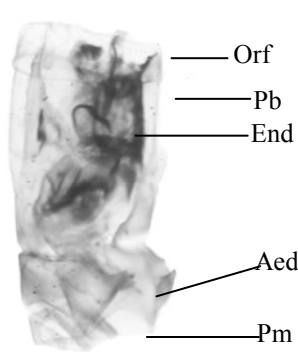


Fig. 1: Male Genitalia of *Onthophagus pactolus* F. (Length 1.5 mm)

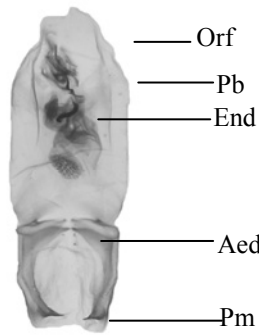


Fig. 2: Male genitalia of *Onthophagus aenescens* Wied (Length 1.5 mm)

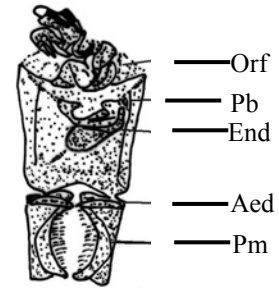


Fig. 3: Male genitalia of *Onthophagus ramosellus* Bates (Length - 1mm)

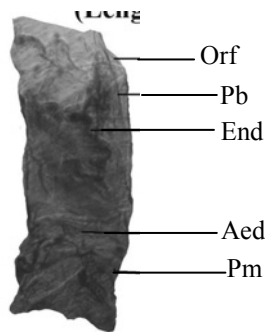


Fig. 4 Male genitalia of *Onthophagus sternalis* Arrow

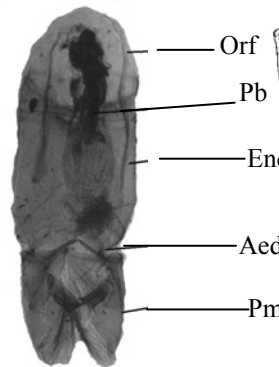


Fig. 5: Male genitalia of *Onthophagus catta* F. (Length-2mm)

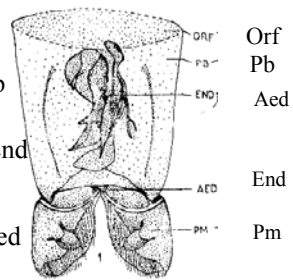


Fig. 6: Male genitalia of *Onthophagus bonasus* F. Length 1.5 mm (Source: Sewak, 1986)

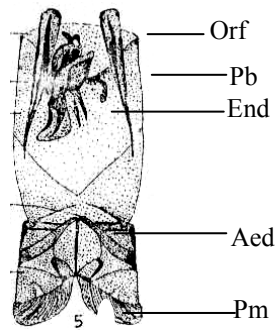


Fig. 7: Male genitalia of *Onthophagus rectecornutus* Lansb. Length 1.5mm (Source: Sewak, 1986)

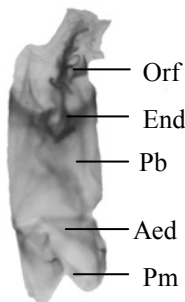


Fig. 3: Male genitalia of *Onthophagus atropolitus* d' Orb. (Length 3mm)

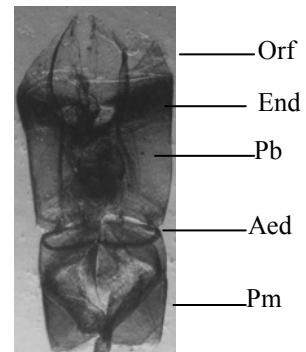


Fig. 3: Male genitalia of *Onthophagus sagittarius* F. (Length 1mm)

ABBREVIATIONS

Aed: Aedeagus, End: Endophallus, Orf: Orifice, Pb: Phallobase, Pm: Parameres

TAXONOMIC IMPORTANCE

The ring shaped phallobase and tubular aedeagus of male genitalia of all the recorded genera of Coprinae in the present study showed a closer resemblance with each other while the structures of parameres and endophallus are greatly different at both generic and species level. Parameres are elongated and bristilized in *Heliocopris*, elongated and bristleless in *Catharsius*, pointed and bristleless in *Onitis*, pointed and bristilized in *Copris*, smaller and bristilized or bristleless in *Onthophagus* and very small and bristleless in *Oniticellus*. The endophallus was observed broadened apically and narrow proximally in *Heliocopris* and *Catharsius*, bristilized sole shaped in *Copris*, H or Y-shaped in *Onitis*, broadened apically in *Oniticellus* and varying shaped in *Onthophagus* and *Gymnopleurus*. Thus, the evidence of male genitalia of dung beetles confirms the independent status in Scarabaeidae.

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