

STUDIES ON THE MORPHOLOGY OF MALE GENITALIA OF
SOME SPECIES OF SCARABAEIDAE (COLEOPTERA).

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INTRODUCTION

Scarabaeidae is one of the largest families of Coleoptera and contains about 25,000 described species under 2000 genera from all over the world. In India about 1,590 species under 203 genera are known (Annonymus, 1991; Arrow, 1937; Balthaser, 1963, 1964; Schenkling, 1921; Young, 1989). The species of this family can easily be recognised by the presence of characteristic form of antennae. However, the genitalia of male (aedeagus) plays an important role in identification of closely related species of scarabaeid beetles. Hence, scanning electron microscope (SEM) was used to study the morphological differences of male genitalia of 10 species of scarabaeid beetles collected from Andaman and Nicobar Islands (Figs. 1-13).

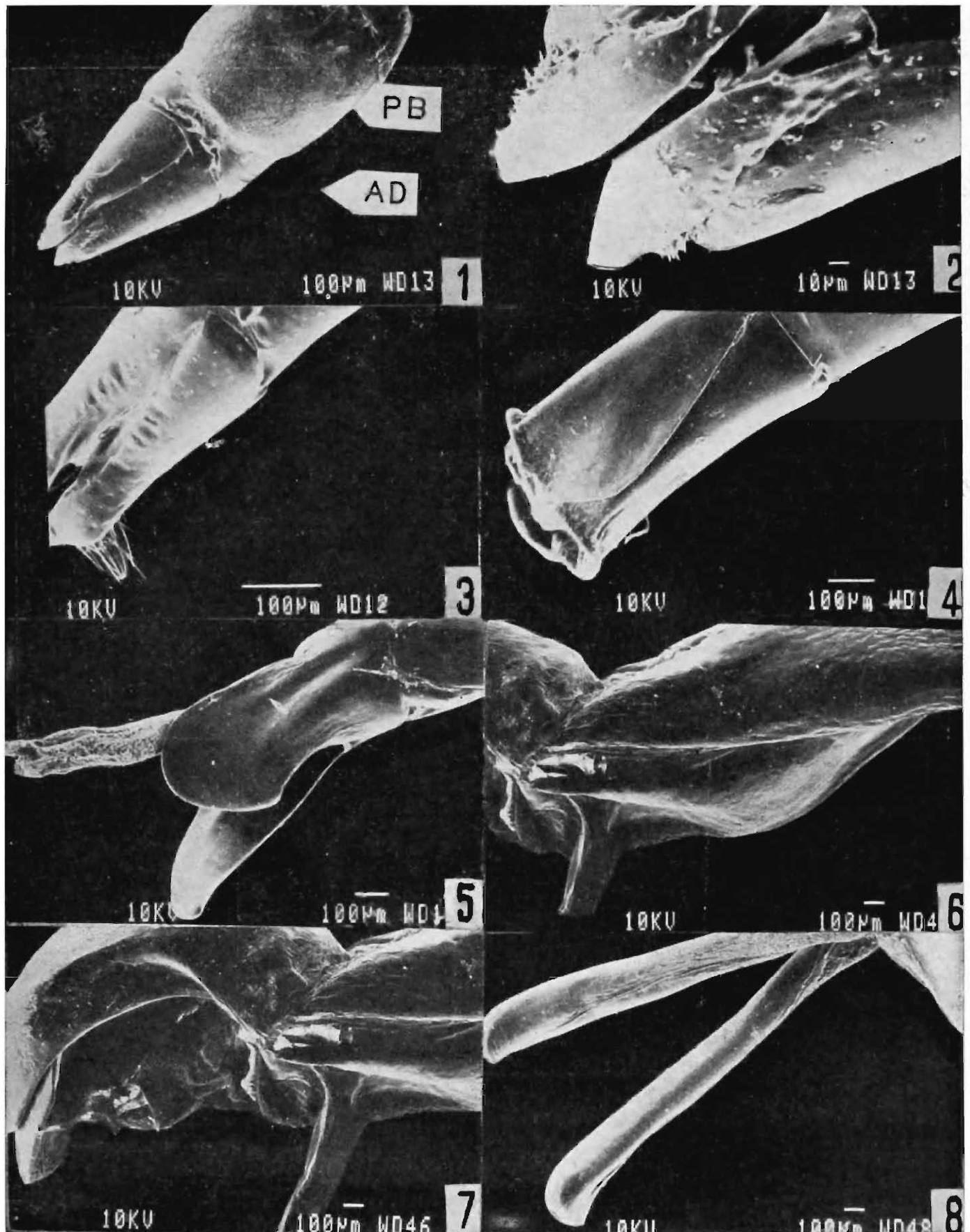
MATERIAL AND METHODS

Fresh samples containing males of 10 different species of Scarabaeidae were separated and cleaned under laboratory using an ultrasonic cleaner. The male genitalia (aedeagus) of each species were dissected out using a fine needle and dehydrated in different concentrations (50, 60, 70 and 100%) of acetone. The air dried samples were coated with carbon and gold in a vacuum coater JEOL JEE-4X. The coated samples were scanned under JEOL JSM-840A electron microscope.

RESULTS AND DISCUSSION

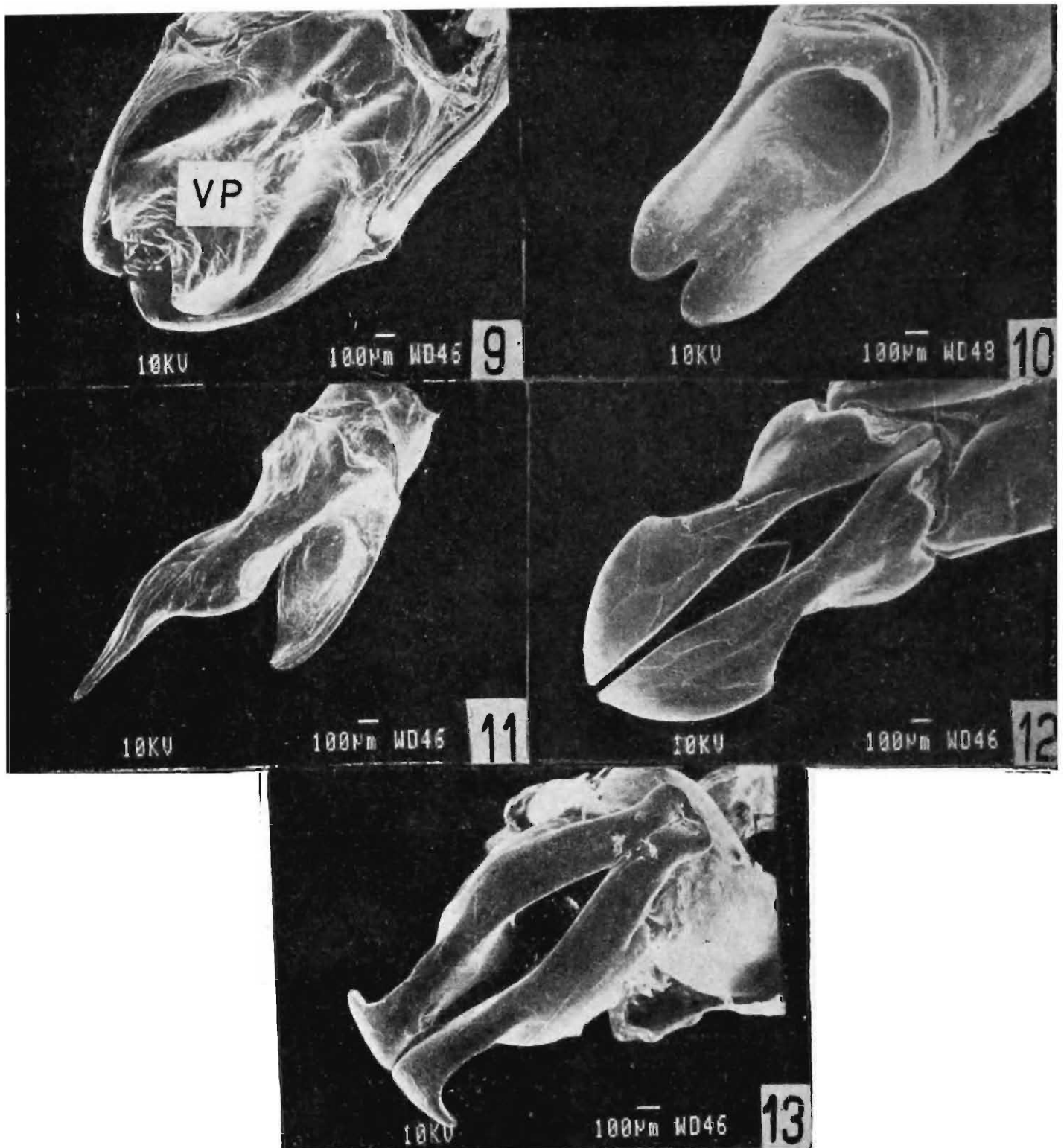
The size of the external male genitalia (aedeagus) of scarabaeid beetles normally varies from 1 mm to 10 mm in length and in most cases their length does not exceed

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Scanning electron micrographs of external male genitalia (aedeagus) of scarabaeid beetles :

Aphodius (Calaphodius) moestus Fabricius (1-2), 1—aedeagus (dorsal view); 2—apical tip of parameres (dorsal view). *Aphodius (Nialus) lividus* (Olivier), 3—parameres (dorsal view). *Aphodius (Pharaphodius) crenatus* Harold, 4—parameres (dorsal view). *Phaeochrous intermedius intermedius* Pic, 5—parameres (lateral view). *Holotrichia nicobarica* Chandra (6-8), 6—phallobase



Scanning electron micrographs of external male genitalia (aedeagus) of scarabaeid beetles :

Anomala desiccata Arrow, 9—parameres (ventral view). *Adoretus costopilosus* Ohaus, 10—paramere (dorsal view). *Adoretus versutus* Harold, 11—parameres (dorsal view). *Heteronychus lioderes* Redtenbacher, 12—parameres (dorsal view). *Alissonotum piceum* (Fabricius), 13—parameres (dorsal view).

VP—paramere.

5 mm, which makes some times very difficult to study the details of aedeagus with the light microscope. The male genitalia has been one of the characters employed in scarabaeid taxonomy especially for identification of species and subspecies. Further it also helps in grouping the taxa at all levels. Hence, the present study has been made on the morphology of male genitalia of fresh samples using scanning electron micrographs. The result obtained is shown in Figs. 1-13, which will help in the identification of species subspecies of scarabaeidae.

Observations on the scanning electron micrographs of aedeagus of 10 species of scarabaeid beetles are as follows :

***Aphodius (Calaphodius) moestus* Fabricius**

(Figs. 1-2)

Size of aedeagus 1.65 mm ; phallobase longer than parameres ; parameres broad at base and narrowing apically, overlapping each other upto middle and apex with a characteristic longitudinal carina with dentations and small grooves laterally ; carinae with asymmetrical spines studded medially on lateral constrictions.

***Aphodius (Nialus) lividus* (Oliver)**

(Fig. 3)

Size of aedeagus 1.75 mm ; phallobase twice the length of parameres ; parameres rather flat and separated with a median long groove, tapered distally and obliquely narrowing apically, with the characteristic long setae on lateral margin subapically ; apices very pointed.

***Aphodius (Pharaphodius) crenatus* Harold**

(Fig. 4)

Size of aedeagus 1.8 mm ; phallobase longer than parameres and tubular ; parameres forming a tubular structure, dilating towards apex and overlapping weach other subapically, with the characteristic apices.

***Phaeochrous intermedius intermedius* Pic**

(Fig. 5)

Size of aedeagus 4.75 mm ; phallobase four times longer than parameres ;

parameres assymetrical ; characteristic longer paramere far extended towards base and narrowing apically ; short paramere slightly widening in apical half, an angular protrusion laterally and bluntly rounded at apex.

Holotrichia nicobarica Chandra

(Figs. 6-8)

Size of aedeagus 6.55 mm ; phallobase twice longer than parameres ; parameres symmetrical, blunt at apex with a hollow contour laterally ; ventral plate continuing into two characteristic long ventral rods across the Phallobase ; ventral rods slightly pointed laterally at apex.

Anomala desiccata Arrow

(Fig. 9)

Size of aedeagus 6.75 mm ; phallobase large ; parameres short and overlapping each other at base, narrowing towards apex, apices blunt ; ventral plate with apical margin strongly bilobed and laterally sinuated at middle.

Adoretus costopilosus Ohaus

(Fig. 10)

Size of aedeagus 3.85 mm ; phallobase longer than parameres ; parameres consolidated ventrally with lateral margins almost straight except at base, very slightly converging posteriorly ; apices blunt with a deep notch in between the parameres at apex.

Adoretus versutus Harold

(Fig. 11)

Size of aedeagus 4.05 mm ; phallobase twice longer than parameres ; parameres assymetrical ; longer paramere sinuated laterally at base, dilated at middle and sharply narrowing towards apex ; short paramere broad at base and gradually narrowing towards apex internally.

Heteronychus lioderes Redtenbacher

(Fig. 12)

Size of aedeagus 6.85 mm ; parameres short, dorsoventrally flattened, slightly curved ventrally, two sinuations at base obliquely, strongly constricted at middle laterally and abruptly dilated distally and narrowing apically.

Alissonotum piceum (Fabricius)

(Fig. 13)

Size of aedeagus 3.65 mm ; phallobase elongate and longer than parameres ; parameres slender; oval and apices truncate and much prolonged outwards.

From the present study it is apparent that the application of SEM to the systematic studies of Scarabaeidae will be a valuable tool to the investigator particularly if micrographs of genitalia could be gathered into a reference atlas.

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SUMMARY

Genitalia of male scarbaeid beetles play an important role in the identification of species and subspecies and also in grouping the taxa at all levels. Morphology of 10 species of scarbaeid beetles occurring in Andaman and Nicobar Islands have been studied using scanning electron microscope. Descriptions have been made using the micrographs and it has been suggested that the application of scanning electron microscopy to systematic studies of the species of scarbaeidae will be a valuable tool to the investigator, particularly if micrographs of diagnostic features could be gathered into a reference atlas.

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