MORPHOLOGICAL STUDY OF MALE GENITALIA OF ICHNEUMONIDAE (INSECTA: HYMENOPTERA) OF SUBFAMILY PIMPLINAE – I

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ABSTRACT

The male genitalia of the genus of Eruga Townes and Coccygomimus Saussure (Ichneumonidae: Pimplinae) are described in present study. The Pimplinae is one of the important subfamily of Ichneumonidae. This subfamily Pimplinae contains 62 genera with 927 species in the Indo-Australian region. In insects male genitalia are organs with the process of mating. The male genitalia are one of the sound character in classifying various genera and species of the Ichneumonidae. The male genitalia of the species of Eruga Townes and Coccygomimus Saussure (Ichneumonidae : Pimplinae) are described.
1 Introduction

In the insect genitalia are blunt and situated externally. Male genitalia are the organs concerned with the process of mating. The male genitalia are one of the sound characters for classifying various genera and species of the Ichneumonidae. Peck (1937) and Pratt (1939) studied the detailed structure of Ichneumonidae male genitalia.

The Pimplinae is one of the important subfamily of Ichneumonidae, which was known earlier as Ephialtinae. The subfamily Pimplinae is more common in the South East Asia, Java, Oriental and Australian regions (Gupta, 1987). This subfamily Pimplinae contains 62 genera with 927 species in the Indo-Australian region (Gupta, 1987). Peck (1937) worked on the male genitalia of Pimplinae results of the study associated post-segmental segments of the taxa and revealed the figures of male genital complexes were also revealed. This study did not illustrate the diagrammatic dorsal view of genitalia of some species but also the external ventral view of the aedeagus. The dorsal view of gonocordo of Megarhyssa citraria forms the parts of Pecks (1937) study. Phand & Ahirrao (2013) work on the male genitalia of the genus of Xanthopimpla Saussure (Ichneumonidae: Pimplinae). They described male genitalia of Xanthopimpla punctata (Fabricus, 1781), Xanthopimpla stemmator (Thunberg, 1822) and Xanthopimpla honorata parahonorata a subspecies nov., (Heble, 1981) were studied.

The genus Eruga Towns (1960) belongs to the tribe Polyshinectini of the subfamily Pimplinae. This is a moderate sized, distributed in Nearctic, Neotrophic, Ethiopian and Oriental regions. Eruga asiansis, a new species described by Nikam (1986) has been explored. The genus Coccygominus Saussure (1892) belongs to the tribe Ephialtini of the subfamily Pimplinae. Coccygominus leothoë Cameron (1897) is a cosmopolitan species occurring in the Oriental region and common throughout India. Many workers attempt the taxonomy and biology of the species. The aspect of the male genitalia was studied by Gupta & Saxena (1987). Many views on the nomenclatorial system of the different parts of the male genitalia exist. To avoid the confusion of various terms formerly used by Boulange Henry (1924) and Snodgrass (1941) were examined. However, the widely accepted terms by Peck (1937) have been used for convenience.

The little work has been done in concern with insect genitalia, the present study is concerned with the whole genitalia of the taxa along with an adequate description. In the present study the male genitalia of subfamily Pimplinae has been exploited with Eruga Towns (1960) and Coccygominus Saussure (1892). The male genitalia of an Ichneunonoid (Figure. 1a and 1b) consist of paramere, volsella, gonolocina, aedeagus, subgenital plate and gonoring.

Paramere is paired lobe exterior to the aedeagus and it acts as lever. Volsella is enclosed between paramere and aedeagus. Its apical region is known as distivolsella and it possess gonolacina on the side. It acts as sperm receptacle. Aedeagus is the cylindrical, pointed structure. Its apical region is called as penis valve, while the basal region is termed as apodeme. It is useful for transfer of the sperms. Subgenital plate is variable in shape and acts as a supporting sclerite in the process of copulation. Gonoring is located at the bottom of the genital complex on which all the different parts of the genital complex are resting.
2 Material and Methods

The study on the male genitalia was attempted by the method described by Townes (1939). Abdominal tips of the male Ichneumon flies were cut off and treated with liquid ammonia for 16 hours. Then different parts of genitalia were separated under binocular microscope and were processed through alcohol grades and mounted on Distrene pasticizer xylene (DPX).

3 Results and Discussion

The male genitalia of Eruga Townes and Coccygomimus Saussure possess striking variations and similarities as shown in Figure. 2 and 3.

3.1 The Subgenital Plate

The subgenital plate of Eruga asiansis is 0.975 mm in length and 0.175 mm in width. In Eruga asiansis the subgenital plate is crescentric, sparsely spinose and its apical edges are pointed. Anticosta curved inwardly and above the speculum. Speculum is basally pointed. In Coccygomimus leothoe subgenital plate is 1.25 mm in length and 0.9 mm in width. The subgenital plate is pentagonal, ending into blunt end and forming a triangular area covered with spines. Its dorsal edges blunt. Anticosta is upto speculum thick along the periphery. Speculum is very short, round and peglike.

3.2 The Aedeagus

The aedeagus of E. asiansis is 0.225 mm and 0.05 mm in length and width. Apical margin of penis valve is blunt, bulgy and medially convex. Basal apodeme of aedegus is very short, blunt and diverent. In C. leothoe aedeagus is 1.25 mm and 0.325 mm in length and width. Apical margin of penis valve is tubular and blunt with dense scattered pits. Medially it is strongly broad. Basal apodeme of aedeagus is elongate, slender, thick and blunt at the tip.

3.3 The Volsella

The volsella of E. asiansis is 0.175 mm and 0.05 mm in length and width. Distivolsella is apically round, blunt and dark but beat small five spots arranged in zig zag manner. Basivolsella is laterally convex and stout thick. In C. leothoe volsella is 0.625 mm and 0.25 mm in length and width. Distivolsella is apically with ten stiff bristles linearly at equidistance, sub apically with six scattered pits. Distivolsellar apodeme is apically blunt, inserted in the middle region of gonolacinia. Basivolsella broad with 33 scattered pits. Basivolsellar is stout thick and basally blunt.

3.4 The Gonolacinia

The gonolacinia of volsella in E. asiansis is 0.075 mm and 0.025 mm in length and width. It is apically tubular and blunt, touching to the distivolsella, subapically four pits. Gonolacinaria apodeme very narrow pointed and fixed on apical margin of basivolsellar structure. In C. leothoe volsella is 0.3 mm and 0.1 mm in length and width. Gonolacinia overlaps on the volsella and apically touching to the apex of distivolsella and middle region is covered with 50 scattered pits. The gonolacinaria apodeme basally tapering and fixed on the dasivolsellar structure.

3.5 The Paramere

The paramere of E. asiansis is 0.35 mm and 0.25 mm in length and width. Gonosquama is apically globular and blunt. Goniostipes is broad and curved inwardly.
Paramere is covered with dense pubescence and projecting ventrolaterally into a stalk. In *C. leothoë* paramere is 1.25 mm and 0.75 mm in length and width. It is triangular and covered with dense pubescence. Gonosquama is apically narrow and pointed. Gonostipes are broad. Gonocoxal arm tapering at the basal end and stalked.

3.6 The Gonoring

The gonoring of *E. asianis* is 0.2 mm and 0.05 mm in length and width. It is apically narrow and blunt, medially broad while basally elongate and stalked. In *C. leothoë* gonoring is 0.75 mm and 0.9 mm in length and width. It is internally appears bell shaped, subapically broader while apically and basally tapering.

Peck (1937) investigated the male genitalia of Pimplinae by selecting taxa belonging to various tribes of which five stands as valid in the recent classification viz. Pimplini, Polyshinctini, Ephialtini, Theronini and Rhyssini. The subgenital plate in Pimplini is also diversified being elongate in *Megarhyssa lunator* Fabr. (Peck, 1937), pentagonal in *C. leothoë* (Cameron) and other taxa (Gupta & Saxena, 1987). While it is strongly concave apically in *E. asianis* sp. Nov. Nikam (1986), triangular in *Xanthopimpla honorata parahonorata* sub sp. Nov. Heble (1981) and *C. shiva* (Gupta & Saxena, 1987).

A tubular aedeagus is characteristic of Pimplinae as observed by Peck (1937) in *Megarhyssa lunator* Fabr.; *Theronia fulvescens* cress; *Theronia melaniceps* (Cress); *Ephialtus tuberculatus*; *Pimpla brevicornis* Grav.; *Pimpla* (Tseropus) *coelebs* Wash; *Pimpla detrita* Holmgr; *Pimpla instigator* Fabr.; *Itoplectis* (Itoplectis) *conquisitor* Say; *Itoplectis* (Itoplectis) *obesus* Cash and all taxa of *Coccygomimus* by Gupta & Saxena (1987). However, the volsella in Pimplinae stand well for variations at the junction of distivolsella and gonolacinia as noted by Peck (1937), Gupta & Saxena (1987.) and in the present taxa with *E. asianis* sp. Nov. Nikam (1986) and *C. leothoë* (Cameron).

In *E. asianis* the subgenital plate is strongly concave, sparsely spinose with speculum basaly pointed but in *C. leothoë* the subgenital plate is pentagonal, ending into blunt end and forming a triangular area covered with spines. Speculum is very short, round and peglike variation occurs in subgenital plate. This type of variations also occurs in aedeagus, gonorong, paramere, volsella and gonolacinia. The variations in parts can easily separating the genus and species of the Ichneumon flies.
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