



Morphological study of male genitalia of Ichneumonidae (Insecta: Hymenoptera) of subfamily Tryphoninae

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Abstract

Tryphoninae, the subfamily of Ichneumonidae is recognized by the compressed abdomen and brownish body. Most of the Tryphoninae species are ectoparasitoids of larvae of Lepidoptera. This subfamily is divided into seven tribes which included 28 genera and 187 species in Indo- Australian area. 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 genus *Netelia* (*Apatagium*) *recta* (Enderlein) and *Netelia* (*Toxichiloides*) *latrolatro* (Holmgren) were described.

INTRODUCTION

In the insect male genitalia were blunt and morphologically external. Male genitalia are the organs with the process of mating. The male genitalia was one of the sound character in classifying various genera and species of the Ichneumonidae. Peck (1937) and Pratt (1939) studied the male genitalia of Ichneumonidae.

Tryphoninae, the subfamily of Ichneumonidae was recognized by compressed abdomen and brownish body. Most of the Tryphoninae species was ectoparasitoides of larvae of Lepidoptera. This subfamily was divided into seven tribes, which include twenty eight genera and one hundred eighty seven in Indo-Australian area.

In the recent years male genitalia of ichneumonidae has been taken into account for classification at various taxonomic categories. It was *Netelia* Grey where in male genitalia have been considered for the first time segregating its various subgenera (Kazuhiko Konishi, 1985; 1986 a and 1986b).

Netelia was one of the largest genus of Tryphoninae and divided into nine subgenera. Peck (1937) attempted the male genitalia of subfamily

Tryphoninae and represented the subgenital plate, lateral view of half paramere and lateral view of aedeagus of the taxa. The male genitalia of *Netelia* were figured for the first time by Townes (1939), who stressed that, these parts was of morphological significance in copulation with the females. Later works on the male genitalia of this genus were those by Rao and Nikam (1970); Nikam (1973 a, b); Gavino Delrio (1974); Kaur and Jonathan (1979); Kazuhiko Konishi (1985) and (1986a, b).

In the present investigation male genitalia of *Netelia* (*Apatagium*) *recta* (Enderline) and *Netelia* (*toxichiloides*) *latrolatro* (Holmgren) was studied.

Morphology of Male genitalia of Ichneumonidae:

The male genitalia of an Ichneumonidae (Fig 1a and 1b) consist of paramere, volsella, gonolacina, aedeagus, subgenital plate and gonoring. Paramere was paired lobe exterior to the aedeagus. It acts as lever. Volsella was 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 was 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 supporting sclerites in the process of copulation. Gonoring is located at the genital complex on which all the different parts of genital complex are resting.

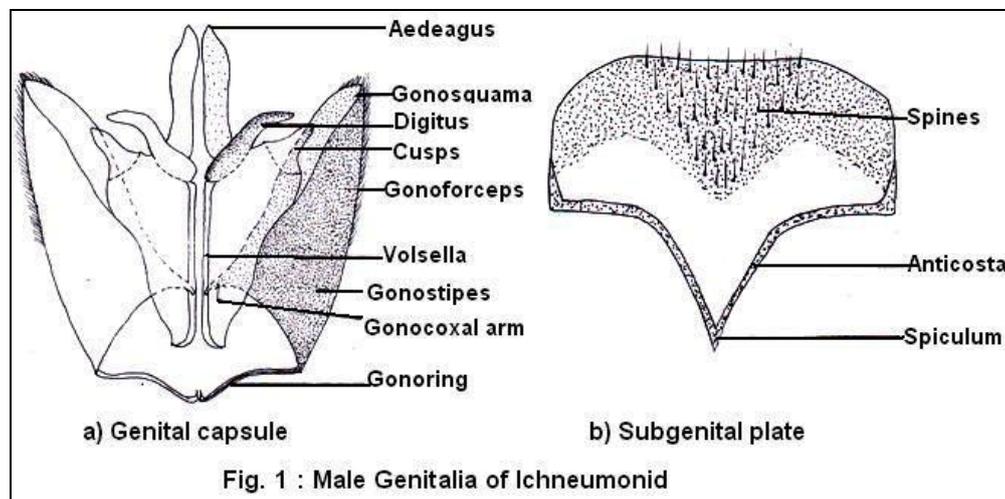


Fig. 1 : Male Genitalia of Ichneumonid

MATERIALS AND METHODS

The study on the male genitalia was attempted by the following method of 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 Distrenepasticizer xylene (DPX).

RESULTS AND DISCUSSION

The male genitalia of *Netelia* (Apatagium) *rectra* (Enderlein) and *Netelia* (Toxochiloides) *latrolatro* (Holmgren) possess striking variations and similarities as showed in Fig.2 and 3

The subgenital plate :

The subgenital plate of *Netelia* (Apatagium) *rectra* was 0.625mm in length and 0.875mm in width. Apical margin slightly convex, subapically concave, dorsaledges straight with many spines and scales. Anticosta curved inwardly, smooth and shiny. Speculum very moderate thick and blunt. In *Netelia* (Toxochiloides) *latrolatro* (Holmgren) in 0.75mm in length and 0.875mm in width. When viewed from dorsal side it appears pentagonal, curved with scales and smaller spines. Anticosta smooth, deeply notched speculum triangular with pointed apex.

The Aedeagus :

The aedeagus of *N.* (apatagium) *rectra* was 0.8mm in length and 0.2mm in width. Apicaly blunt, conical,

medioventral area flat. Basal apodeme of aedeagus was elongate, convex and curved. In *N.*(Toxochiloides) *latrolatro* is aedeagus is 0.875mm in length and 0.15mm in width. Pens valve tabular outwardly concave, apical end scattered pits are present and basal apodeme of aedeagus is petiolate.

The volsella :

The volsella of *N.* (Apatagium) *rectra* was 0.625mm in length and 0.275mm in width. Convex in lateral view, laterally rounded mush bended downwards and provided with marginal twelve pits and along periphery six spines. Remaining part of the volsellatrapezoid, bearing bristles in interior region, medially broad, posteriorly blunt. In *N.*(Toxochiloides) *latrolatro* volsella is 0.625mm in length and 0.52mm in width. Dorsolaterally is protruding into a round knob on flat area it bears thirteen pits through which hair emerge out. Posterior end is round and blunt.

The Gonolacina :

The gonolacina of volsella in *N.* (Apatagium) *rectra* was 0.225 mm in length and 0.125 mm in width. Tip small like a bud with apex facing downwards, basically overlapping with the volsella at its apical corner and bearing eight fine teeth on its surface. In *N.* (Toxochiloides) *latrolatro* gonolacina is 0.275mm in length and 0.075mm in width. It is attached to the dorsolateral margin of the volsella, truncate at the free end having twelve pits. Its outer lateral side is convex.

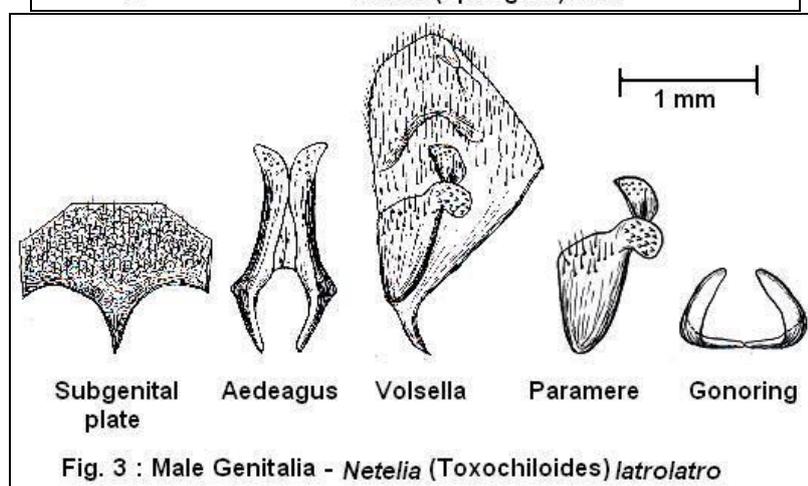
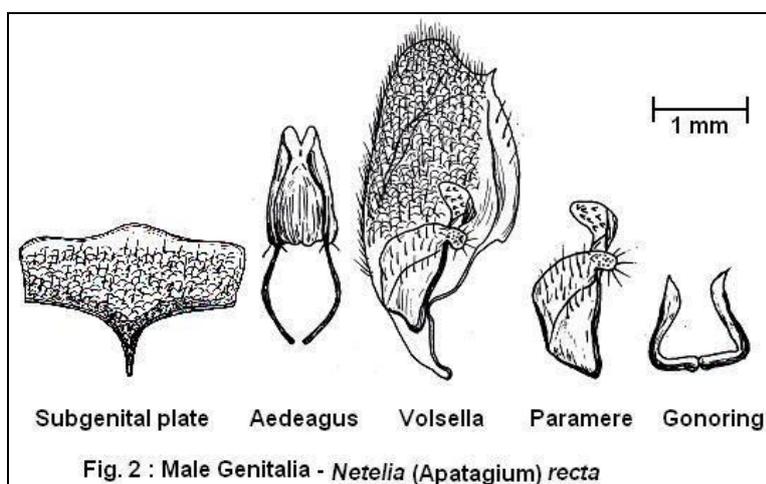
The Paramere :

The paramere of *N. (Apatagium) recta* was 1.625 mm in length and 0.75 mm in width, medially broad, narrow towards the basal side with grounded apical margin. Basoapically with distinct, pointed spinner Pad is situated above gonoforceps and apically open. Brace narrow and tips of brace laterally tapering. Pad pointed and touching each other, brace prominent, outer two third part of paramere fully covered with fine hair. Gonocoxal arm tapering and label. In *N. (Toxochiloides) latrolatro* is 1.5 mm in length and 0.875 mm in width. Broad in middle, pointed at basal side,

apically flat and spinose, outer two third part of the paramere fully covered with fine hair. Gonocoxal arm tapering and pointed. Pad is located on subapical portion, bluntly jointed to the pad dorsomedially.

The Gonoring :

The gonoring of *N. (Apatagium) recta* was 0.5mm in length and 0.025 mm in width attached below the paramere, apically pointed, medially narrow and nasally tubular. In *N. (Toxochiloides) latrolatro* is 0.75mm in length and 0.25mm in width. Apically blunt, medially broad and nasally narrow.



The value of the male genitalia of Hymenoptera for taxonomy has been discussed for the first time by Peck (1937). Immediately a noteworthy attempt was made by Pratt (1939). In majority of the Hymenoptera, the lateral and posterior margins of subgenital plates has specific values as in Ichneumon - Linnaeus (1758), Nikam 1973a and 1973b, Phand and Ahirrao, 2013, 2015a and 2015b.

The parameters are important sclerites separating various groups and subfamilies of the Ichneumonidae Peck 1937. The volsella is variable in its shape and structural peculiarities, since it basically takes apart in finding, clasp and stretching the membrane lying adjacent to the female gonopore of Ichneumonidae. The lateral semicircular sclerites form the angular gonocardo variations in the shape of gonoring have been noted.

A typically Ichneumonidae aedeagus is weakly depressed and cylindrical with its posterior apex curved centrally. This is the intromittent organ and thus being important, Peck (1937) noted fine species which were divided into three groups on the shape of aedeagus. Similar structure was observed in male genitalia of subfamily Pimplinae (Phand and Ahirrao, 2013, 2015a and 2015b).

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