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Studies on genitalia of *Mansonia (Mansonoides) uniformis* (Theobald) and *Mansonia (Mansonoides) indiana* Edwards with the aid of Scanning Electron Microscopy (SEM).

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Abstract

The comparative studies were conducted on the genitalia of male and female mosquitoes of *Mansonia (Mansonoides) uniformis* (Theobald) and *Mansonia (Mansonoides) indiana* Edwards with the help of Scanning Electron Microscope (SEM). These two species are the members of medically important subfamily Culicinae. SEM studies have been done for the very first time in Punjab to determine the various new and additional taxonomic attributes.

Keywords: SEM, genitalia, *Mansonia uniformis*, *Mansonia Indiana*.

1. Introduction

Mosquitoes are one of the most important group of insects affecting humans and animal health. They occupy diverse habitats, feed on a variety of animals and transmit life threatening diseases [1]. The species of *Mansonia* include some of the vicious day and night biting mosquitoes belonging to genus *Mansonoides* are peculiar in that larval and pupal life is spent submerged in the water of ponds and marshes. Their period of greatest activity is just about dusk and then attracted to the human habitation. Their flight appears somewhat clumsy as compared to others [2]. Regarding its distribution within the surveyed regions suggested that *Mansonia uniformis* will breed in Sugarcane plantation [3]. Morphological contribution was made by Harbach and Knight (1980) [4]. Numerous characters of female genitalia have been proven to be valuable in distinguishing species at various levels. The males of *Mansonia* subgenus *Mansonoides* have been carefully studied and figured by Barreto and Coutinho (1944) [5]. Female terminalia of many African and Oriental species of *Mansonia* subgenus *Mansonoides* has been worked out by a number of researchers like [6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17]. In the present work, an attempt has been made to study new attributes in the structure of the genitalia of both the species.

2. Materials and Methods

Collection cum survey tours were conducted in different districts of Punjab. A large number of representatives of the species under study were collected from Harike wetland with the help of oral aspirators, test tubes, torch and insect collecting nets. Identification done by using the keys given by [18, 19, 20, 21] and [22]. For scanning electron microscopic study protocol given by [23] and [24] was followed. The terminology of [4] for naming constituent parts of genitalia was followed. For genitalic studies, the last two abdominal segments of an adult male and female mosquitoes were snipped off with fine forceps from their body. These abdominal tips were boiled in 10% KOH solution until their clearance. Dissected material washed several times with water and dehydrated by passing through ascending grades of alcohol. The specimens were placed on stubs in dorsal positions after air drying on filter paper and coated with gold. After that images were observed under JSM-6610LV SEM.

3. Results and Discussion

Keeping in view the taxonomic significance of genitalic attributes, the authors have made detailed observations on the structure of male and female genitalia in the present communication for the first time with the aid of SEM.

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3.1 Male Genitalia

i) *Mansonia uniformis*

Basistyle expanded ventrally with rows of setae on its surface and without subapical lobe, 10-12 setae on its inner row, small in size as compared to rows of setae on its dorsal and lateral side (Fig. 3); dististyle stout, strongly flattened from side, curved with angle from distal end to middle and tapering into blunt ends and covered with hairs on convex side (Fig. 2); claspette stem strongly developed and long, reaching as far as the distal end of basistyle, claspette originating from middle of basistyle, filament of claspette rod shaped with bifid claw (Fig. 4); paraproct shorter than aedeagus, denticulate and highly sclerotised (Fig. 4); aedeagus rounded with toothed projection [9].

ii) *Mansonia indiana*

Basistyle having rows of setae on its surface and subapical lobe absent; 9-11 setae on its inner row,

small in size as compared to rows of setae on its dorsal and lateral side (Fig. 9); dististyle short and curved, forming an angle from distal end to middle and ending with flattened apex (Fig. 11); claspette stem well developed as long as reaching up to base of lower end of dististyle with elongated claw, stem of claspette originating from base of basistyle (Fig. 11); paraproct sclerotised with triangular apex (Fig. 10).

3.2 Female Genitalia

i) *Mansonia uniformis*

Tergum IX (Fig. 5) having teeth like structure along with 9-11 chitinous hooks in the middle of the ventral side (Fig. 7 & 8).

ii) *Mansonia Indiana*

Tergum IX with teeth like structure (Fig. 14); postgenital lobe forming a pit like structure on the ventral side (Fig. 13 & 14).

Mansonia (Mansonoides) uniformis (Theobald)

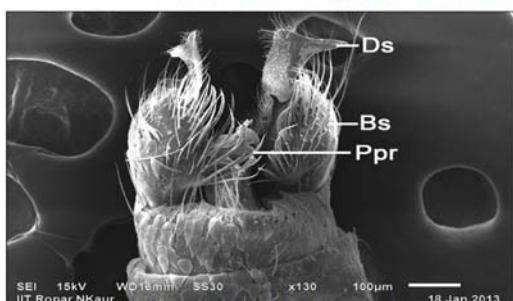


Fig. 1 Male Genitalia

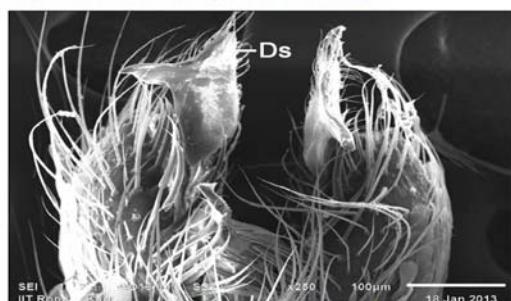


Fig. 2 Dististyle

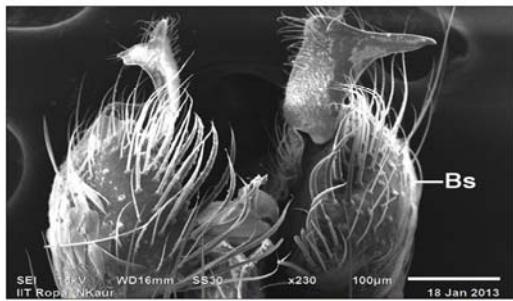


Fig. 3 Basistyle (Showing Setae)

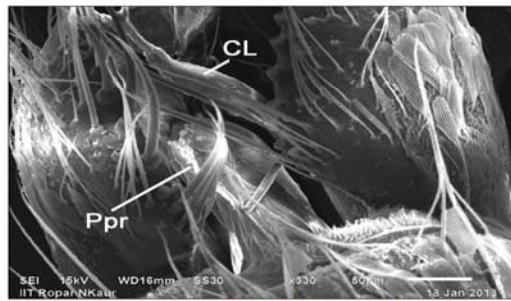


Fig. 4 Phallosome

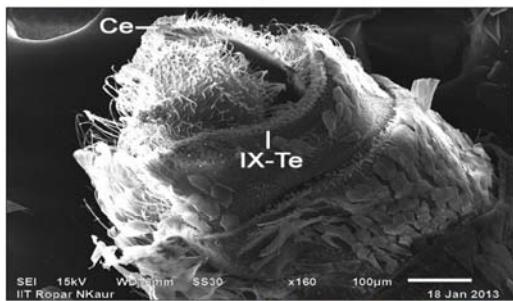


Fig. 5 & 6 Female Genitalia (Dorsal view)

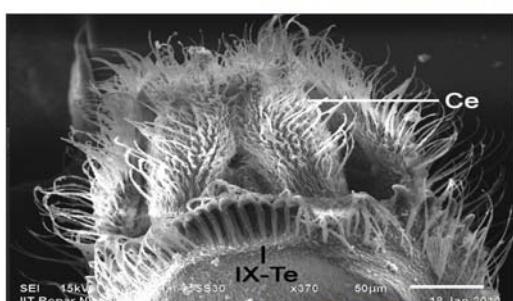
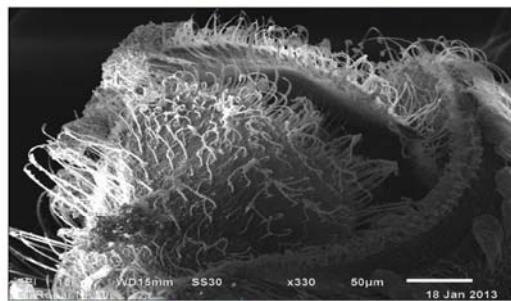
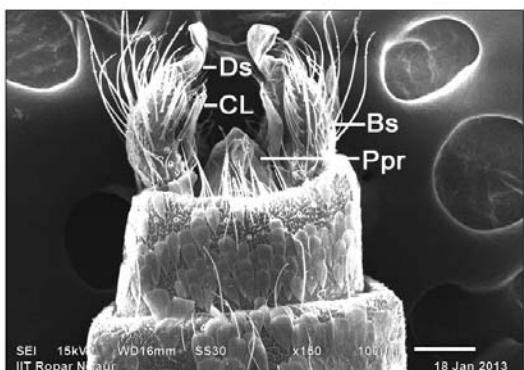
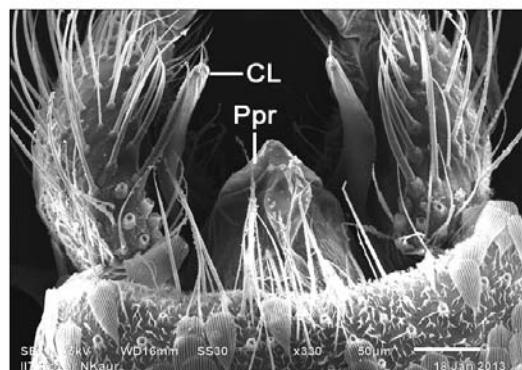
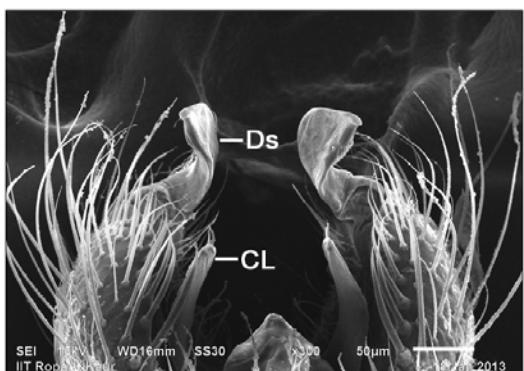
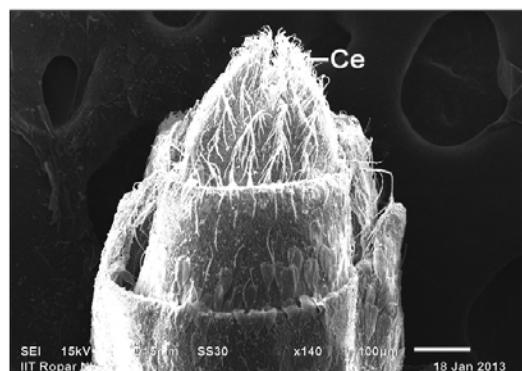
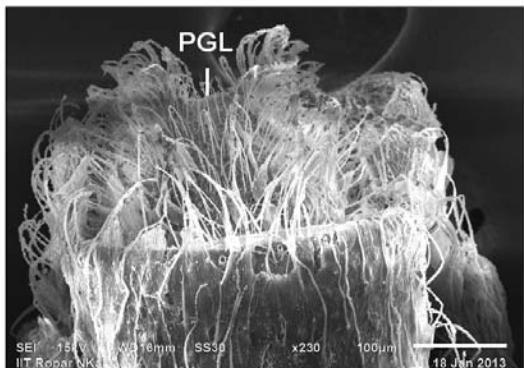
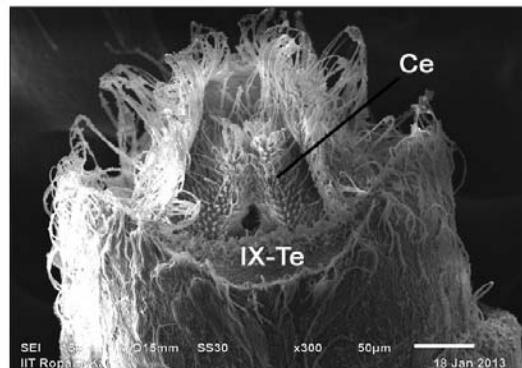


Fig. 7 & 8 Female Genitalia (Ventral view)

Mansonia (Mansonioides) indiana Edwards

**Fig. 9 Male Genitalia****Fig. 10 Phallosome****Fig. 11 Dististyle & Claspette****Fig. 12 Female Genitalia****Fig. 13 Postgenital Lobe****Fig. 14 Female Genitalia (Ventral view)**

PGL (Post Genital Lobe), Ppr (Paraproct) and IX-Te (IX-Tergum)

4. Conclusion

Mansonia uniformis (Theobald) is the primary vector of *Wuchereria bancrofti*, Bancroftian *Brugia malayi* (Malayan filariasis) and *Brugia pahangi* (Tropical eosinophilia). Chikungunya virus was also isolated from this species. But the other species *Mansonia indiana* Edwards has been incriminated as a vector of periodic *B. malayi* in Indonesia, Thailand, India and Ceylon [26]. Both the species distinguished from each other with respect to the pale bands on hind tarsomeres and ill defined spots on scutum. In the present research work various structures like claspette, basistyle, dististyle, phallosome, post genital lobe etc. has been studied which are helpful in the species identification purposes.

5. Abbreviations

Bs (Basistyle), Ce (Cerci), CL (Claspette), Ds (Dististyle),

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