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Scanning electron microscopic (sem) studies on external genitalia of *Anopheles (Cellia) Stephensi* liston

Authors: Shipali and Jagbir Singh Kirti

Abstract

Scanning Electron Microscopic (SEM) studies have been conducted on genitalic structures of *Anopheles (Cellia) stephensi* Liston for the first time from India. External genitalic attributes are highly species specific in many insect groups in general and mosquitoes in particular. Though the external male and female genitalic structures have already been studied by taxonomists in case of this most important vector species. Many additional characteristics have been found which will prove useful in sorting out species complex of this group.

Keywords: *Anopheles stephensi*, Male and female genitalia, Claspette, cerci, Postgenital lobe, IX-tergum

1. Introduction

It is medically very important to obtain ecological and taxonomical data of blood sucking female mosquitoes especially those of Anophelines (Hara ^[1]). As many as, 17 species of subfamily Anophelinae and family Culicidae have been conducted from Punjab state during recent collection-cum-survey tours. *Anopheles (Cellia) stephensi* Liston has been procured from the length and breadth of the state and is the most dominant Anopheline species. Keeping in view, the importance of species specific attributes i.e. genitalic structures, an effort has been made to explore more taxonomic attributes of male and female genitalia with the help of Scanning Electron Microscope.

Shipali

Department of Zoology and
Environmental Sciences, Punjabi
University, Patiala- 147002, India.

Jagbir Singh Kirti

Department of Zoology and
Environmental Sciences, Punjabi
University, Patiala- 147002, India.
E-mail: prjagbir2005@gmail.com

Corresponding Author:

Shipali

Department of Zoology and
Environmental Sciences, Punjabi
University, Patiala- 147002, India.
E-mail: shifali267@gmail.com

2. Materials and Methods

Male and female specimens of species under study were collected from throughout Punjab state. The specimens were collected by using test torch method and oral aspirators. For SEM studies, method given by Lee & Craig [2] followed. For genitalic attributes, last three segments of both male and female specimens were dissected with the help of forceps. These were first boiled in 10% KOH

for 10-15 minutes, washed with water several times, air-dried and mounted. After mounting, these were sputter-coated with gold and scanned with JSM-6610LV scanning electron microscope. 5-7 specimens were used for each investigation.

The terminology for various morphological characters and abbreviations has been adopted given by Harbach & Knight [3], [4].

Male genitalia of *Anopheles (Cellia) stephensi* Liston

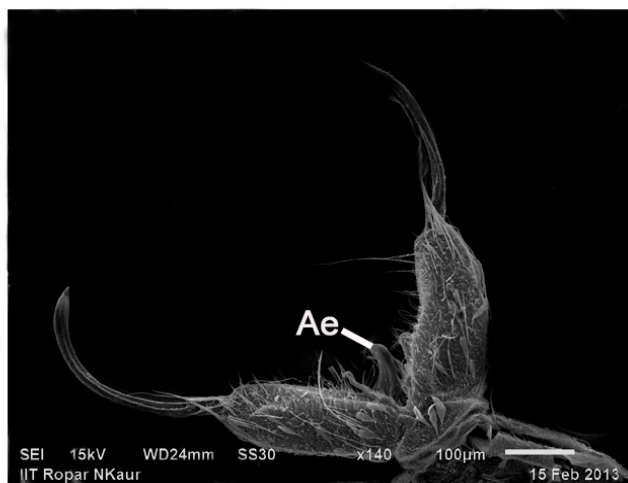
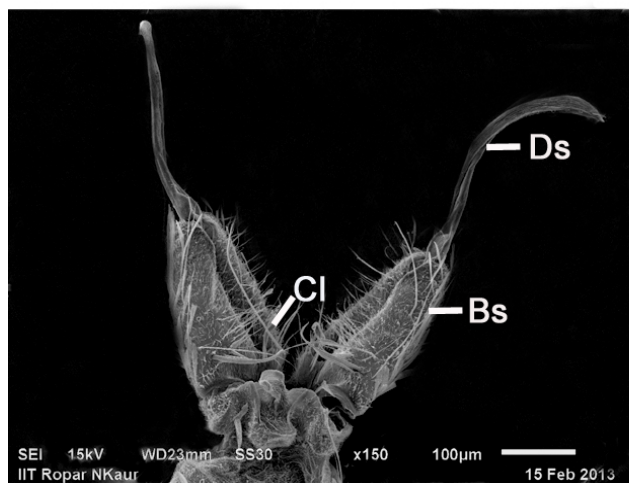


Fig 1 & 2: Male genitalia

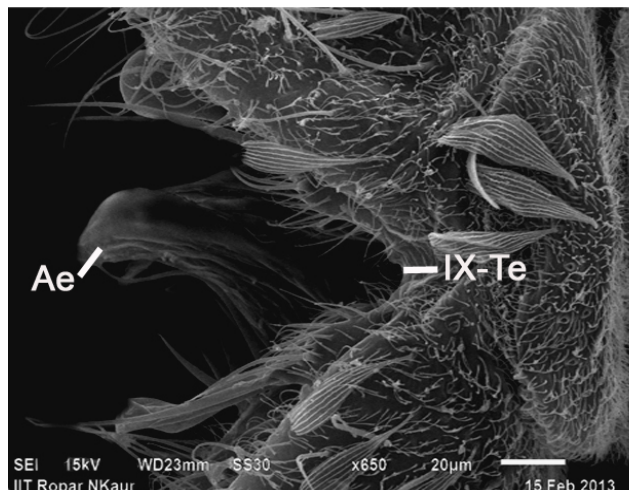


Fig 3: Phallosome (Magnified)

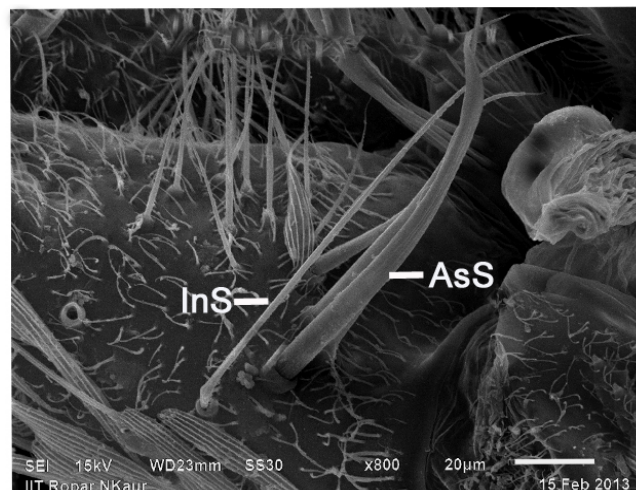


Fig 4: Different types of spines on basistyle

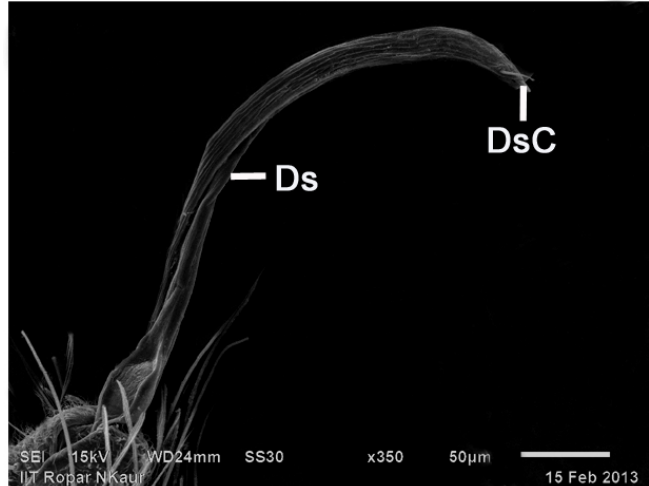


Fig 5: Dististyle (Magnified)

Female genitalia of *Anopheles (Cellia) stephensi* Giles

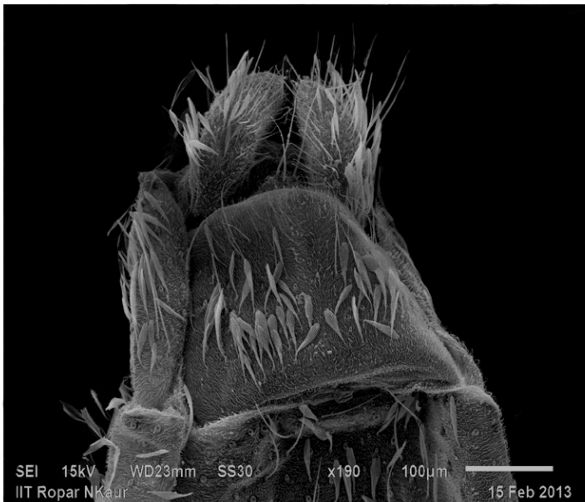


Fig 6: Female genitalia

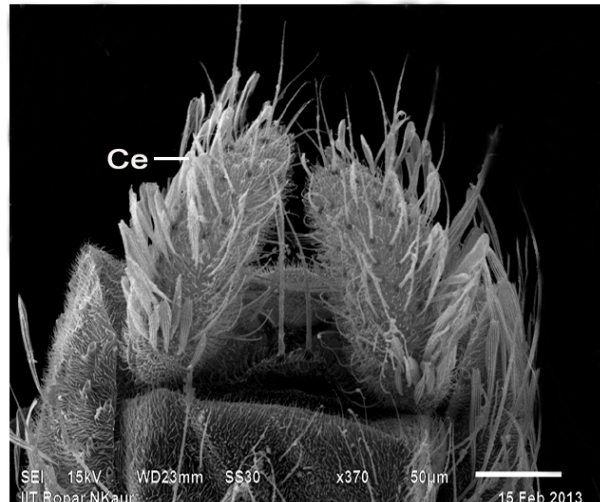


Fig 7: Magnified view

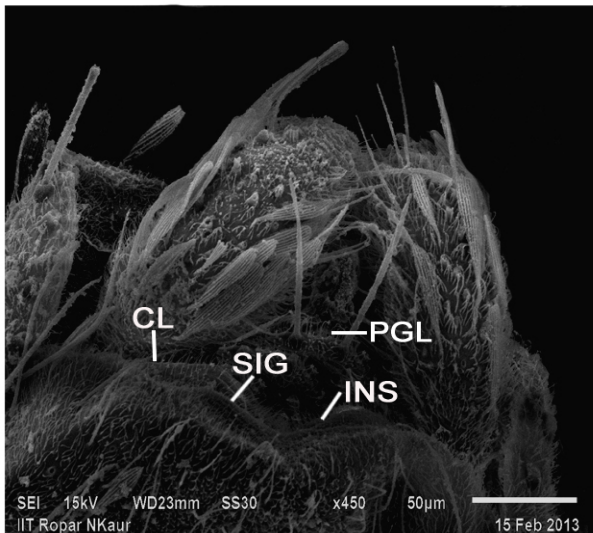


Fig 8: Female Terminalia

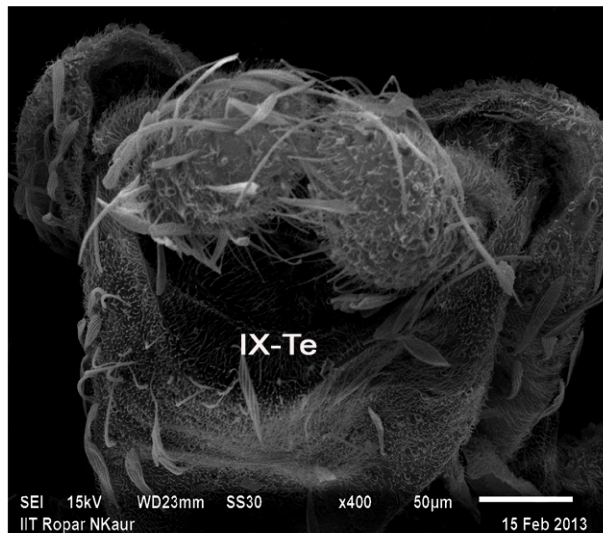


Fig 9: Dorso-caudal view

3. Results and Discussion

3.1 Male genitalia: The male genitalia composed a definite structure. It bears two basistyle having movable dististyle apically (Fig. 1 & 2). Dististyles sickle shaped with a claw at tip with a small spiniform spine near claw in dorsal view (Fig. 5). This spine is not present in all Anopheline species. Generally, basistyle having two accessory seta (AsS) and one internal seta (InS) but here, three accessory setae were found in spite of two and this might be variation or new observation in structure of male genitalia. Internal seta longer and thin as compare to accessory seta (Fig. 4). Parabasal lobe (PBL) has not been studied in the present work; possibly, it lost during the preparation of material. Club shaped claspettes arising from base of basistyle visible (Fig. 1). Shape of IX-tergum varies from species to species and it is important character for species identification. V- shaped IX-tergum clearly visible in this species (Fig. 3).

3.2 Female genitalia: Different views of female genitalia of present species have been studied in detail.

3.2.1 Dorsal view (Fig. 6): Cerci are one of the pair of appendages of abdominal segment IX often articulate with mire anterior segment, particularly when the posterior segment are reduced (Harbach & Knight^[3]). In dorsal view, pair of cerci clearly visible, covered with several types of seta on its surface (Fig. 6 & 7). Shape of Postgenital lobe (PGL) and IX-tergum species specific. PGL possesses

between cerci. One pair of long and thin seta arising from tip of PGL. Insula downwards in middle portion making curve like structure; Cowl with downwards curve at ends; Sigma with blunt apex, fine structure and apex joint at some point in middle (Fig. 8 & 9).

3.2.2 Dorso-Caudal (slightly lateral view): Cerci and IX-tergum are clearly visible in this view (Fig. 9). Shape of IX-tergum very definite, arcuate and band like in the species under reference.

4. Conclusion

External male and female genitalic structures are highly species specific in subfamily Anophelinae. These structures can be used for discriminating various allied species of genus *Anopheles* Meigen. External male and female genitalia have been studied by many workers like Hara^[1], Christophers^[5] and Harbach & Knight^[3].

A lot of work has been done on its adult and immature stages. Egg of same species was studied by Chaudhary & Gupta^[6] and Harbach & Knight^[3] studied larval stage with the aid of SEM. Puri^[7], Christophers^[4], Ross and Robert^[8], Nagpal and Sharma^[9] identify and studied various aspects of this species in detail. However, nobody has studied the ultra structure of this very important vector species. Scanning Electron Microscopic studies have been conducted on male and female genitalia of species *An. stephensi* to explore additional taxonomic attributes for the first time in India.

5. Abbreviations

Aedeagus (Ae), AsS (Accessory spine), Basistyle (Bs), Ce (Cerci), Cl (Claspette), CL (Cowl), Dististyle (Ds), Dististyle Claw (DsC), InS (Internal spine), INS (Insula), Postgenital Lobe (PGL), Sigma (SIG), IX-Te (IX-Tergum).

6. Acknowledgement

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