Available online at www.ijpab.com

ISSN: 2320 – 7051
Int. J. Pure App. Biosci. **3 (1):** 214-216 (2015)

Research Article

INTERNATIONAL JOURNAL OF PURE & APPLIED BIOSCIENCE

Studies on Cibarium of *Culex univittatus* Theobald with the Aid of Scanning Electron Microscope

Jagbir Singh Kirti, Simarjit Kaur* and Navneet Kaur
Department of Zoology & environmental Sciences, Punjabi University, Patiala- 147002
*Corresponding Author E-mail: simarjit485@gmail.com

ABSTRACT

A detailed description of the cibarial armature of Cx. univittatus Theobald has been given in this communication for the first time with the aid of Scanning electron microscope. The description of cibarial armature is based on the characteristics like lateral flanges, cibarial bar and cibarial teeth. Besides this, the number, distribution and type of the sense organs have also been described.

***Keywords**: Diptera, cibarium, Cx. univittatus, SEM.*

INTRODUCTION

Mosquitoes (Diptera: Culicidae) have eminence medical importance and are among the most intensively studied across the world. Most of the taxonomic keys for mosquito identification are based on the morphological characters of female or larvae, while only a few use male mosquitoes and mosquito eggs for differentiating mosquito species. The external features, particularly such as scales and hairs are removable or losable, and often become unsuitable for differentiating a number of closely related species. In these cases, investigation on the internal structures like cibarial armature becomes necessary.

The use of morphology of cibarial armature is not new in mosquito taxonomy. A lot of work have been done by workers like Sinton & Covell[7], Barraud & Covell[1], Lane[4], Cheng[3],Valencia[10], Lee[5], Sirivankaran[9], Lee & Craig[6]. The present species *Cx. univittatus* Theobald is a member of Pipiens group of subgenus *Culex* and can be distinguished from its other allied species with the help of few small post spiracular scales and pale longitudinal stripes on legs. These scales and stripes are easily removed from the dry specimens with time. Therefore, SEM studies have been conducted on cibarial armature of this species for the first time to study its taxonomic relevance. The characteristics like lateral flanges, cibarial bar, cibarial teeth; the number, distribution and type of the sense organs are described in detail.

MATERIAL AND METHODS

Several collection-cum-survey tours were conducted at regular intervals throughout the state of Punjab. The adult mosquitoes were collected from gardens, human dwellings, cattle sheds and paddy fields with the help of oral aspirators and torch. The adults caught were killed with ethyl acetate and preserved in collection boxes for further investigation. They were identified with the help of the keys of Barraud[2] & Sirivanakaran[8]. The method given by Lee and Craig[6] was followed for studying cibarial armature with certain changes. The heads of the adult female mosquitoes were alienated from their body and boiled in 10% KOH solution till their clearance. These were then washed several times in water. The head was placed on a slide with a drop of water, dissected with the help of dissecting needles, under binocular microscope having as an attachment camera. Compound eyes were slowly pulled apart in order to expose cibarium which is located immediately behind the clypeus. The specimens were washed in several changes of distilled water and dehydrated by passing through ascending grades of alcohol. The specimens were then put on stubs in dorsal position after air drying on filter paper and coated with gold.

After that images were observed under JSM-6610LV Scanning Electron Microscope at Indian Institute of Technologies (IIT), Ropar.

RESULTS AND DISCUSSION

CIBARIUM: Length of cibarium twice its width and anterior dorsal hard palate about one-third length of cibarium.

Cibarial armature: (Fig. 1 & 2)

***Culex* (*Culex*) *univittatus* Theobald**

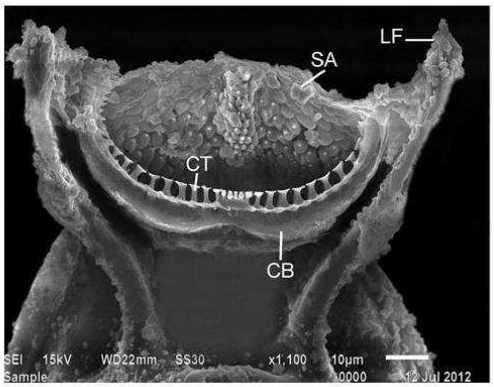

Figure 1. Cibarial armature

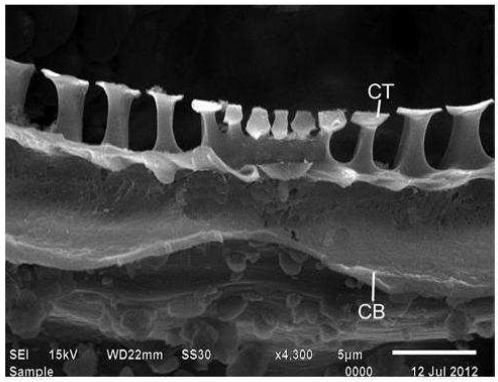

Figure 2. Cibarial teeth

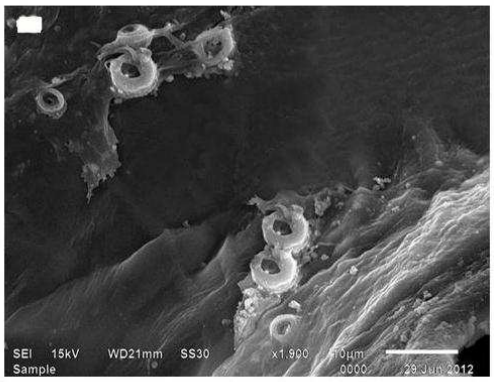

Figure 3. Smaller dorsal papillae

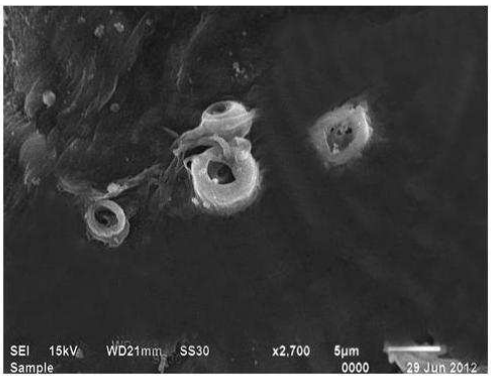

Figure 4. Smaller dorsal papillae (magnified view)

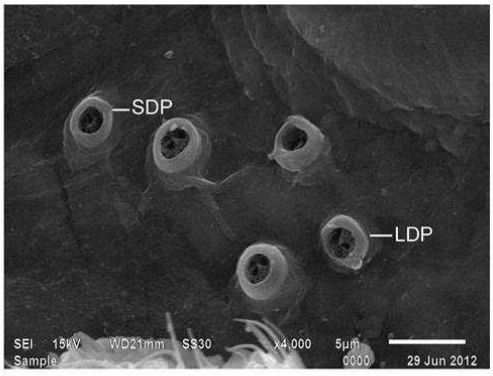

Figure 5. Antero-dorsal membrane

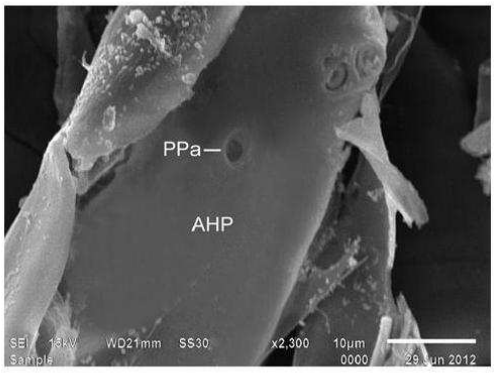

Figure 6. Palatal papillae

Abbreviations: AHP– Anterior Hard Plate, CB– Cibarial bar, CT– Cibarial teeth, LDP– Larger dorsal papillae, LF– Lateral Flange, PPa– Palatal Papillae, SA– Shagreened area, SDP– Smaller Dorsal Papillae

Lateral flanges stout, upper ends not curved outwards; width between posterior ends of two lateral flanges ranges between 84.16 ± 8.25µm. Median portion of cibarial armature evenly concave, slightly convex in center, in the form of a thick, broad bar or cibarial bar on which 32-35 cibarial teeth present. Cibarial teeth short, 3.53 ± 0.49µm in length, arranged in a row, somewhat wide at bases, comparatively narrow in center, blunt and smooth at apex; teeth from concave aspect well developed but from convex aspect reduced; teeth arising from posteromedial sides of lateral flanges reduced. Overlying median portion of cibarial bar, hemispherical, reticulate or denticulate known as shagreened area which presumably represents posterior end of posterior hard palate of cibarium.

Cibarial sense organs:

- Palatal papillae: 3 in number, a pair of papillae situated near to periphery and one situated near to center of posterior end of anterior hard palate; socket diameter ranges from 2.70 ± 0.36µm (Fig. 6).
- Larger dorsal papillae: 4 in number, forming quadrilateral shape, one pair situated at a short distance apart from each other; socket diameter ranges from 1.67 ± 0.14µm (Fig. 5).
- Smaller dorsal papillae: 7 in number, four on one side and three on another side of anterior hard palate, equally situated on both sides. Four papillae making two pairs on either sides and others 3 placed on another side; socket diameter ranges from 1.66 ± 0.18µm (Fig. 3-5).

Mosquitoes are medically most important insects because they act as vectors of many serious diseases to man kind. Different taxonomic attributes have been studied to authentically identify various new attributes in the family Culicidae with the aid of scanning electron microscope. The SEM studies have been conducted on ultra structure of cibarial armature of *Cx. univittatus* for the first time to find its taxonomic relevance. It is worth to mention here that the new attributes such as lateral flanges, cibarial bar, cibarial teeth; the number, distribution and type of the sense organs can be added in the detailed diagnosis of present species.

REFERENCES

1. Barraud, P.J. & G. Covell. The morphology of the buccal cavity in anopheline and culicine mosquitoes. *Ind. J. Med. Res*. **15**: 671-679 (1928)
2. Barraud, P.J., *The Fauna of British India including Ceylon and Burma.* London: Taylor and Francis. pp: 1-508. (1934)
3. Chen, CY., Studies on morphology of the cibarium in Culicine mosquitoes. J. Formosan Med. Assoc. **71(5)**: 282-291 (1972)
4. Lane, J., Neotropical Culicidae. Univ. Sao Paulo, Sao Paulo, Brazil. **1**: 548 p. (1953)
5. Lee, R., Structure and function of the fascicular stylets, and the labral and cibarial sense organs of male and female *Aedes aegypti* (L.) (Diptera: Culicidae). Quaest Entomol. **10**: 187-215 (1974)
6. Lee, R.M.K.W. & D.A. Craig. Cibarial sensilla and armature in mosquito adults (Diptera: Culicidae). *Can. J. Zool.* **61**: 633-646 (1983)
7. Sinton, J.A. & G. Covell, The relation of the morphology of the buccal cavity to the classification of anopheline mosquitoes. *Ind. J. Med. Res*. **15**: 301-308 (1927)
8. Sirivanakarn, S., A revision of the subgenus *Culex* in the Oriental region (Diptera: Culicidae). *Contrib. Amer. Ent. Inst.* **12(2)**: 1-272 (1976)
9. Sirivanakarn, S., The female cibarial armature of New World *Culex*, subgenus *Melanoconion* and related subgenera with notes on this character in subgenera *Culex, Lutzia* and *Neoculex* and genera *Galindomyia* and *Deinocerites* (Diptera: Culicidae). Mosq. Syst. **10**: 474-492 (1978)
10. Valencia, J.D., Mosquito studies (Diptera: Culicidae) XXXI. A revision of the subgenus *Carrollia* of *Culex*. Contrib. *Am. Entomol. Inst*. **9**: 1-134 (1973)