

**TAXONOMIC OBSERVATIONS ON THE FAMILY  
DELPHACIDAE WITH SPECIAL REFERENCE TO WING  
VENATION AND MALE GENITALIA\***

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The family Delphacidae, was till recently considered by some workers as a subfamily of family Fulgoridae. Fabricius recognised the group with his genus *Delphax* in 1798, and Leach (1815) gave it a family rank. The members of this family were characterised by the presence of a large mobile spur (calcar) borne on the inner side of the apex of the hind tibia,

Muir (1915) divided the family into the two subfamilies, Asiracinae and Delphacinae and the subfamily Delphacinae into the three tribes viz. Alohini, Tropidocephalini and Delphacini, on the basis of the morphological characters like the nature of the calcar, presence or absence of teeth on calcar, nature of legs, carination on head and thorax and the nature of the antennal segments. Giffard (1921), Muir (1921) and Hassan (1948) stressed the importance of male genitalia in the taxonomy of delphacids. The taxonomic studies of Indian Delphacidae are very meagre, the main contributions being those of Distant (1906-1917) and Muir (1913-1934).

The present investigations were undertaken to make a comprehensive study of the Indian Delphacidae in view of its importance as pests of a number of crops like sugarcane, paddy, oats, wheat, barley and maize and also in view of their role as vectors of plant viruses.

**Material and Methods**

The insects studied were mainly those collected inside lamp domes. Light trap collections also were made at Trivandrum, Tiruvella, Pathanamthitta, and Trichur (Kerala); Goimbatore (Tamil Nadu); Coorg (Mysore); Kalimpong (West Bengal); Gauhati and Shillong (Assam) and New Delhi. A few specimens were sorted out from the unidentified collection in the National Pusa Collection (NPG) collected from Pusa and Ranchi (Bihar); Chapra and Darjeeling (West Bengal); Sholapur and Basin Fort Maharashtra); Mt. Abu (Rajasthan); Raipur and Gwalior (Madhya Pradesh); Simla (Himachal

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Pradesh); Delhi; Port Blair (Andamans) and Afghanistan. A few specimens were obtained by sweeping on grasses and crop plants from Trivandrum, Trichur and New Delhi.

Dry mounts of wings were prepared for venational studies. The wings were dropped into a droplet of glacial acetic acid placed on a slide and stretched out with the help of microneedles. The acid was then sucked out by means of a blotting paper and the wings allowed to dry on the slide. Minute droplets of insect gum were fixed on the four corners of a cover slip which was then placed over the dried wings and gently pressed.

For the study of male genitalia the whole abdomen or its tip was detached and boiled in 10% KOH solution for a minute or two. On cooling, the material was transferred to glacial acetic acid for 5 to 10 minutes and then into glacial acetic acid with a trace of acid fuchsin. The stained specimen was transferred to carbol-xylol (carbolic acid and xylol mixed in the ratio of 1:3) for clearing. All these were completed in 15 to 20 minutes. After clearing the stained genitalia was transferred into a drop of Canada balsam on a slide and the different parts dissected out and mounted.

### Observations

#### *Distribution*

An interesting feature which emerged out of the studies on Indian Delphacidae was the complete absence of the subfamily Asiracinae and the Delphacine tribe Alohini in our country. So far members of the tribes Delphacini and Tropidocephalini alone could be collected. The absence of the subfamily Asiracinae is also reported from Africa (Muir, 1926) and from Hawaii (Zimmerman, (1948). It is probable that the primitive Asiracinae and Alohini are highly restricted to definitive ecological pockets while the more highly evolved delphacines and tropidocephalines are much more extensive in distribution.

#### *Wing Venation and Male Genitalia*

Observations on the taxonomic characters of 46 species of Indian delphacids collected from various regions of the country revealed certain heretofore unrecorded differences between the two tribes Tropidocephalini and Delphacini particularly with reference to the venational characters and male genitalia. These were as follows:

(1) In the tribe Delphacini (Fig. A) veins  $R_1$ ,  $R_s$  and  $M_1$  of the tegmina usually arise from a common stalk before branching whereas in the tribe Tropidocephalini (Fig. B) one vein  $R_1$  is distinctly separated.

(2) In the hindwing of Delphacini veins  $M$  and  $Cu_1$  run parallel to each other until they are connected by a cross vein, but in Tropidoceph'alini these veins are amalgamated after a short distance from the base.

Plate-1

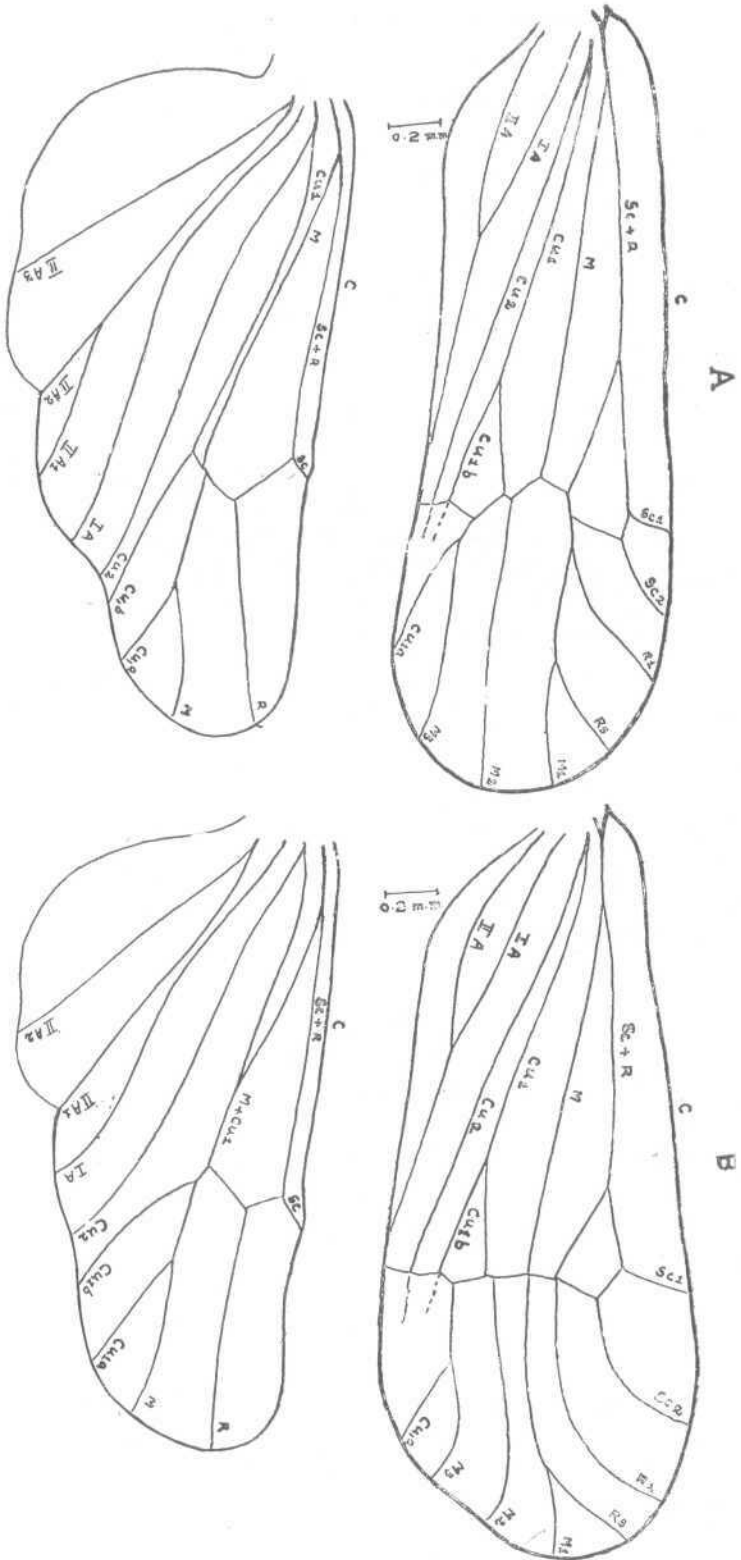


Fig. A. Wings of *Sogatella furcifera* (Horv.) (Delphacini)

Fig. B. Wings of *Tropidocephala signata* (Dist.) (Tropidocephalini)

(3) The second anal vein in the hindwing is divided into three branches in *Delphacini* whereas in *Tropidocephalini* it is forked only once.

(4) There are one or two pairs of anal spines in *Delphacini* which are absent in *Tropidocephalini*.

(5) In *Tropidocephalini* the *aedeagus* is always associated with a penis guide usually on the left side which is wanting in *Delphacini*.

Muir (1915) divided the two tribes mainly on the basis of the nature of the tibial spur and the presence or absence of teeth on the spur which was followed by the later workers for segregating the two groups. The present studies show that the differences observed in the venational and genitalic structures are equally important taxonomic characters in separating the two tribes. So a *dochotomous* key for the easy separation of the species of Indian delphacids under the two tribes is proposed hereunder:

*Key to the tribes of Indian Delphacidae*

Hind tibial spur thick, flattened or concave on inner face, hind margin without teeth. Forewings with  $R_1$  separate, not forming a common stalk with  $R_s$  and  $M_1$ ; hindwings with  $M$  and  $Cu_1$  fused together after a short distance from base, second anal vein divided into two branches. Anal segment devoid of spines.

TROPIDOCEPHALINI

Hind tibial spur thin, laminate or foliaceous, usually deeply concave on inner face, hind margin with a row of distinct teeth. Forewings with  $R_1$   $R_s$  &  $M_1$  usually arising from a common stalk; hindwings with  $M$  and  $Cu_1$  not fused together, second anal vein divided into three branches. Anal segment with spines.

DELPHACINI

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## REFERENCES

- Distant, W. L., 1906, *Fauna British India*, 3: 465-491
- , 1907, *Ent. Monthly Mag.*, 43: 10
- , 1912, Descriptions of New Genera and Species of Oriental Homoptera. *Ann Mag. Nat. Hist.*, (8) 9. 190-194
- , 1916, *Fauna British India*, 6: 134-145
- , 1917, Rhynchota. Part II Suborder Homoptera. *Trans. Lin. Soc. Lond. Zool.* 17: 306-307
- Giffard, W. M., 1921 The systematic value of the male genitalia of Delphacidae (Homoptera) *Ann Ent. Soc. Amer.*, 14: 135-140
- Hassan, A. J., 1948, The significance of genitalia in generic classification of Araeopidae. *Bull. Soc. Fouad. Ent.*, 32: 85-93
- Muir, F., 1915, A contribution towards the taxonomy of Delphacidae *Canad. Ent.*, 47: 268-270, 296-302
- , 1919, Notes on Delphacidae in the British Museum Collections. *Canad. Ent.* 51(1): 6-8
- , 1921, On some Delphacidae from South India (Homoptera) *Proc. Hawaiian Ent. Soc.*, 4(3): 480-486
- , 1925, The morphology of the aedeagus in Delphacidae (Homoptera). *Trans. Ent. Soc. London.*, 74 (2) : 377-380
- Zimmerman, E. C , 1948, Insects of Hawaii. Homoptera: Auchenorrhyneta, 4 : 134-248

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