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Taxonomy of *Armigeres* (*Armigeres*) *theobaldi* Barraud (Diptera: Culicidae): A new report from Punjab

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Abstract
The species, *Armigeres* (*Armigeres*) *theobaldi* Barraud has been reported for the first time from Punjab. An examination and detailed taxonomic descriptions of the adult female and genitalia have been given in the present manuscript with the aid of coloured photography.

Keywords: mosquito, species, adult and culicine

Introduction
Armigeres theobaldi was proposed by Barraud (1934) [1] as a nomen novum for *Desvoidea apicalis* Theobald, 1910 based on only a single female specimen. Toma *et al*. (1994) [14] described and illustrated the female, male, pupa and fourth-instar larva of *Armigeres theobaldi* Barraud from Thailand with line diagrams. Species of the subgenus *Armigeres* are mostly well defined and can be easily identified by male genitalia (Ramalingam, 1987) [15]. The habitat and the animal fauna associated with *Curcuma* inflorescence, as well as the population regulation of *Armigeres theobaldi* were described by Mogi and Yamamura (1988) [6]. This studied species has been reported from Mansa District of Punjab state for the first time. The morphology of adult female and external genitalic features has been described in the present manuscript.

Material and Methods
Collection-cum-survey tours: Intensive and extensive collection-cum-survey tours were conducted in different districts of Punjab from the selected collection sites i.e. gardens, human dwellings, cattle sheds and paddy fields etc. The adult representatives of mosquitoes were collected from their resting and breeding sites during dusk and dawn hours i.e. between 6:00 A.M. to 10:00 A.M. and 7:00 P.M. to 10:00 P.M.

Collection and preservation of adults: Adult mosquitoes were procured with the help of insect collecting nets, test tubes, oral aspirators and torch and from gardens, cattle sheds, hay stacks, nurseries, human dwellings and forests. The collected specimens were killed with ethyl acetate vapours. The ventral thorax region of adult specimen was then glued on the pointed tip of a wedge, made of thick paper, using mounting glue. The paper wedge was supported on a paper pin. A paper slip bearing complete collection data was attached with the help of a pin under each specimen. These mounted specimens were then preserved in collection boxes. Naphthalene balls were used for fumigating purpose in air tight collection boxes of insect cabinets.

Identification of adult mosquitoes: All the preserved Culicine mosquito species were authentically identified by using standard keys and literature. The nomenclature given by Harbach and Knight (1980) [3] for various parts of adult and larval forms has been adopted in the present manuscript.

Preparation of slides for genitalia (♀): The fixed specimen of mosquito was removed from the wedge of paper and placed on a slide. The last 2-3 segments of abdomen of adult representative were removed with the help of a fine forcep. Protocol of Siverly and Shroyer (1974) [12] was followed with slight modifications for making permanent slides of genitalia. Alienated abdomens were then boiled in 10% KOH solution for 20-25 minutes. The dehydration was completed in ascending grades of alcohol for 10-15 minutes in each grade. After dehydration, the genitalia structures were kept in clove oil overnight for proper clearance. Mounting was done on the next day in Canada balsam in dorsal view and examined under microscope for detailed study. For the nomenclature of various parts of male and female genitalia, works of Sirivanakarn (1976) [11], Huang (1979) [4] and Reinert (2000)[7] were followed.

Photography
Adults: Photography of adult specimens was done under Stereo Zoom binocular microscope (Radical- RXLr-5) fitted with camera (Procam 1.3 with Tsview software) attached over it.

Slides: Genitalia (Whole mount) slides were photographed at 10X and phallosome of each species photographed at 40X magnification under Leica trinocular microscope (DM4000 B LED).

Results

Armigeres (*Armigeres*) *theobaldi* Barraud

Barraud, 1910, *Rec. Ind. Mus*., 5.

(Fig. 1-7)

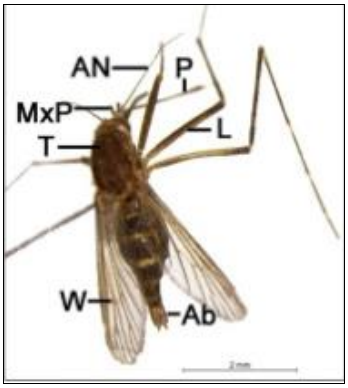

Fig 1: Adult

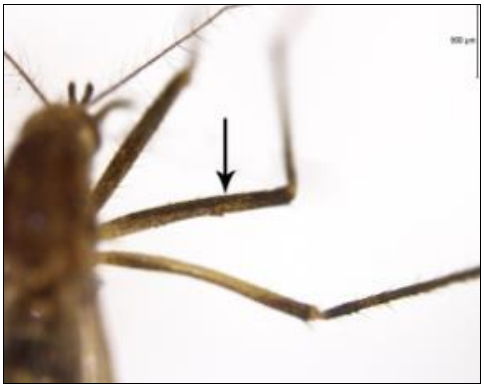

Fig 2: Legs

Fig 3: Abdomen

Fig 4: Tergum

Fig 5: Sternum

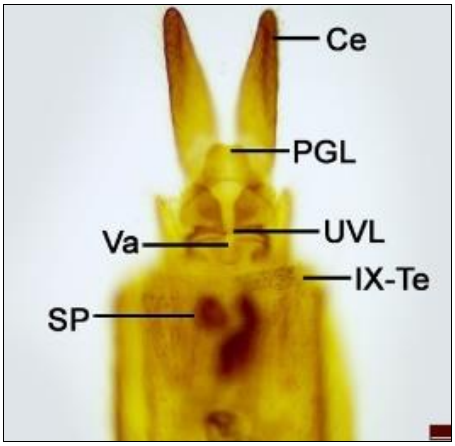

Fig 6: Women Genitalia

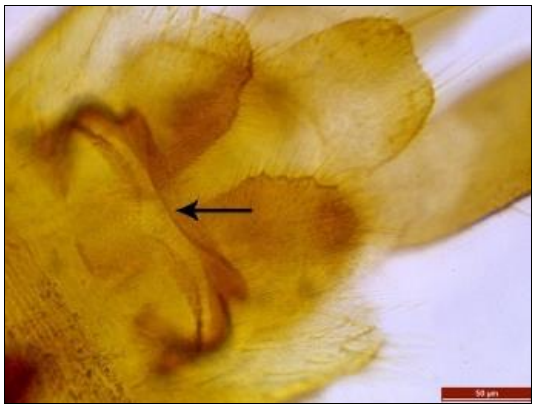

Fig 7: Female Terminalia magnified view

Female

Head: Proboscis long, slightly curved, laterally compressed and uniformly furnished with dark scales; antenna long, pilose type with white scales on flagellomere I on its inner side; vertex with broad dark scales; occiput laden with white erect forked scales.

Thorax: Scutum covered with brown scales gave metallic luster; prescutellar and acrostichal setae absent; scutellum with white scales and each scutellar lobe setosed with 6-10 brown setae; mesopostnotum bare; antepronotal lobes of normal size with small scales having 4-5 setae; prespiracular setae absent; postspiracular area with whites scales and 2-4 setae; mesokatepisternum with row of setae on posterior border; mesepimeron with large patch of white scales; metaepisternum and mesomeron bare.

Wings: All veins dark except anal vein ending well beyond fork of Cu; calypter covered with long hair like scales.

Legs: Coxae covered with white scales; posterior side of mid coxae without sclaes and setae, fore and mid femora totally white except dorsal surface black; all tibia black with ventral surface white; ungues of fore and mid leg equal, large and toothed; ungues of hind leg smaller but without teeth.

Abdomen: Tergum I-VII with prominent semicircular yellowish white medial apical patch and sternum I-VIII entirely white scaled except for lateral and apical margins.

Female Genitalia: Cerci elongated with setae and highly sclerotized on lateral sides; postgenital lobe with a slight depression and furnished with 3-4 setae on the sides with some microsetae; upper vaginal lip moderately chitinized; inconspicuous three spermatothecae present.

Male: Not studied.

Taxonomic Discussion: This species was first proposed by Barraud (1934) as *nomen noven* for *Desvoidea apicalis* Theobald. He provided descriptions based on single female specimen. Mattingly and Qutubuddin (1952) [5] and Thurman (1958) [13] studied and illustrated the description of adult male specimen. Then, Toma *et al*. (1994) [14] collected many immature stages and adults of this species from Northern Thailand to redescribed it.

Barraud (1934) [1] recorded only the few female specimens from Myanmar and Assam. Larvae and pupae of this species were observed in small quantities of water that had collected in flowers of *Curcuma pseudo-montana* in the Satpura range of Central India and larvae crawl over the petals of flowers (Chari, 1940) [2]. Toma *et al*. (1994) [14] provided the descriptions of larvae and pupa for the first time from Thailand along with the descriptions of adult male and female representatives.

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