

Indian J. Med. Res. Vol. XI, No. 1, 1923.

SOUTH EAST ASIA MOSQUITO PROJECT  
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A REVISION OF THE CULICINE MOSQUITOES  
OF INDIA.

Part IX - ~~XIII~~ ~~XVII~~

THE INDIAN SPECIES OF LUTZIA THEO.

BY

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(In Charge Enquiry upon Indian Culicidae, under the Indian  
Research Fund Association.)

[Received for publication, July 30, 1923.]

THE adult mosquitoes of this genus resemble large species of *Culex* in general appearance and structure, and in scaling, and until recently have been included in that genus, although as long ago as 1906 Christophers suggested that the Indian species should be placed in a separate genus (*Jamesia*) on account of the structural characters and habits of the larvae (Sci. Mem. Med. Off. India, New Series, No. 25, 1906, pp. 10 and 12). Edwards in his Revision of the Mosquitoes of the Palearctic Region (Bull. Ent. Res., Vol. xii, part 3, November 1921, p. 327), and in his Synopsis of adult Oriental Culicine Mosquitoes (Ind. Jour. Med. Res., Vol. x, No. 1, July 1922, p. 274), placed the Oriental species in *Lutzia* (a genus erected by Theobald in 1903 for a South American species), the adults being distinguished from *Culex* by the possession of more numerous lower mesepimeral and proepimeral bristles. In Brunetti's Catalogue of Oriental and South Asiatic Nematocera (Rec. Ind. Mus., Vol. xvii, 1920) the names of five species now included in *Lutzia* are given, viz:—*Culex concolor* R. Desv., *Culex fuscanus* Wied., *Culex tigrripes* Grandpre, *Culex halifaxii* Theo., and *Culex setulosus* Dol. Of these *C. concolor* and *C. setulosus* have been sunk under Wiedmann's

*C. fuscatus* by Edwards, who has examined the types of the last two, and it is thought that *C. tigrripes*, which is an African species, does not occur in the Indian region. *C. halifaxii*, which is found chiefly in the Malay Peninsula, Borneo, Philippines, and Australia, has been found in Assam, and is likely to occur in Burma.

Two new species have been recently described by Edwards, *L. vorax* and *L. raptor*, both of which are found in India.

As stated in the following part of this Revision I have not been able to discover any satisfactory characters by which the larvae of the three common Indian species may be separated. All the species are evidently very closely related, and although there are differences in the adult mosquitoes in colouration and venation these characters are subject to a good deal of variation, and in certain localities some of the species approach one another very closely. There are small differences in the male genitalia which appear to be constant, but this may not be the case over the whole range of each species.

*Male hypopygium.* The general structure resembles that of *Culex*. *Subapical lobe of side-piece* without a leaf-like plate, but with several strong bristles, usually three in number, but in some specimens there may be four or even five (fig. 3.) *Clasper* curved, tapering, and with a small terminal appendage (fig. 2.) *Ventral cornu of lateral plate of phallosome* large and pointed (fig. 7. vc.); *lateral process* moderately developed (fig. 7. lp.); *median process* (fig. 7. mp.) divided into a number of teeth, and moderately developed in all species except *L. fuscana* (compare figs. 7, 8, 9, and 10). *Basal apodeme* (fig. 1. ba. and fig. 5), and *parameral plate* (fig. 1. pp. and fig. 4) large.

Photographs showing markings and structure will be published with a following part of this Revision.

SYNOPTIC TABLE FOR THE IDENTIFICATION OF THE INDIAN  
SPECIES OF LUTZIA.

1. Anterior surface of hind femur pale scaled on basal half except dorsally, pale scaling on apical half forming a line to the tip .. .. .	2
Anterior surface of hind femur with numerous dark scales on basal half, apical half without a distinct line of pale scaling to the tip .. .. .	3
2. Abdominal tergites with whitish or ochreous apical bands on all the segments, those on the last few segments a little broader than on the anterior .. .. .	<i>raptor.</i>

Abdominal tergites 5 to 8 entirely yellow scaled or with broad apical bands; tergites 2 to 4 entirely dark, or with very narrow apical bands	..	<i>fuscana</i> .
3. Abdominal tergites with pale apical bands on all the segments, all about the same width	..	<i>vorax</i> .
Abdominal tergites entirely dark, or with very narrow whitish apical bands, or lateral markings only on the last few segments	..	<i>halifaxi</i> .

**Lutzia fuscana** (Wied.)

*Culex fuscatus*, Wiedmann, Dip. Exot. 1, 1821, p. 9.

*Culex concolor*, Robineau Desvoidy, Mem. Soc. His. Nat. de Paris,  
IV, 1825, p. 405.

*Culex setulosus*, Doleschall, Nat. Tijd. Ned. Ind. XIV, 1857, p. 384.

*Lutzia concolor* (R.-D.), (Theo.), Edwards, Bull. Ent. Res., Vol. XII,  
part 3, November 1921, p. 327.

*Lutzia fuscana* (Wied.), Edwards, Ind. Jour. Med. Res., Vol. X,  
No. 1, July 1922, p. 275.

In the most usual form the 6th, 7th, and 8th abdominal tergites are entirely yellow scaled, the 5th with a broad yellow apical band, the 2nd to 4th either entirely dark, or with narrow apical bands; in some specimens there is a pair of median lighter spots on the last mentioned tergites. In the marking of the hind femur this species agrees with *L. raptor*, and in some localities the two species approach one another very closely both in the abdominal banding and in venation. In typical *fuscana* the posterior cross vein is slightly nearer the base of the wing than the mid, or the two may be in line, but in some specimens from Assam the position of the cross veins is as in *raptor*.

Male hypopygium (figs. 1 to 7). Subapical lobe of side-piece usually with a fourth spine more or less developed and separate from the other three; lateral plate of phallosome with a less pronounced median process than in the other species.

*L. fuscana* is common in most parts of India, chiefly in the plains, but has been found up to 4,000 ft. in the Khasia Hills, Assam.

Specimens from the following places have been examined by the writer:—

Punjab; Kalka (*Christophers*).

Bombay; Bombay City and Parel, July 1921 (*Barraud*).

Bombay Deccan; Belgaum, August 1921 (*Barraud*).

Bengal; Calcutta, Chittagong, Rangmati, and Sukna, July and August 1922 (*Barraud*).

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Assam ; Shillong, Nongpoh, Dimapur, and Dibrugarh, July and August 1922 (*Barraud*).

Andaman Islands (*Christophers*).

Ceylon (*James*).

Burma ; Rangoon (*Christophers*).

The types of *C. fuscannus* and of *C. setulosus* were in the Vienna Museum, but are not now in existence. The type of *C. concolor* is apparently lost

***Lutzia raptor* Edw.**

Edwards, Ind. Jour. Med. Res., Vol. X, No. 1, July 1922, p. 275.

Distinguishing characteristics:—Outer side of hind femur almost entirely pale scaled on the basal half, except dorsally, apical half with a median pale stripe reaching almost to the tip. Abdominal tergites all with pale ochreous apical bands, the last few but little broader. Posterior cross vein usually much nearer the base of the wing than the mid, but this is by no means always the case. Long segment of male palpi entirely pale scaled on the apical third, base of penultimate segment all pale scaled.

Male hypopygium ; subapical lobe of side-piece usually with only three strong bristles, but a fourth is sometimes present. Lateral plate of phallosome (fig. 8) with a pronounced median process divided into small teeth ; ventral cornu, in side view, less tapering than in the other species ; lateral process rounded.

Found chiefly on the western side of India from the Punjab to Ceylon, and often with *L. fuscana*. In some localities the two species approach one another closely in colouration and venation, but there appears to be a constant difference in the male genitalia.

Type in the British Museum, from Amritsar, May 1921 (*Barraud*).

The Central Malaria Bureau collection, Kasauli, contains specimens from the following places:—

Punjab ; Kalka (*Christophers*), Amritsar, May 1921 (*Barraud*),  
Delhi (*Christophers*).

Bombay ; Bombay City, Parel, and Trombay, July 1921 (*Barraud*).  
Bombay Deccan ; Poona (*Major H. Brown Mason*), Belgaum and  
Tavargatti, August 1921 (*Barraud*).

North Kanara ; Hubli and Kadra, September 1921 (*Barraud*).

Madras ; Nilgiri Hills, October 1915 (*Khazan Chand*).

Ceylon ; Suduganga (*R. Senior White*).

**Lutzia vorax** Edw.

Edwards, Bull. Ent. Res., Vol. XII, part 3, November 1921, p. 327.

Distinguishing characteristics :—Outer side of hind femur with very numerous dark scales on the basal half, the light scales evenly sprinkled ; posterior cross vein slightly but generally distinctly nearer the tip of the wing than the mid, or the two may be in a straight line ; abdominal tergites all with distinct apical pale ochreous bands, all of about the same width ; penultimate segment of male palpi with the integument and hairs dark except at the extreme tip.

I have examined over one hundred specimens of this species from various parts of India. In the majority the position of the cross veins is as given above, but in four males and one female from Assam the posterior cross vein is slightly nearer the base of the wing than the mid, and in seven males and three females from various localities they are in a straight line. There is some variation in the amount of pale scaling on the hind femur, and on the abdomen, and some specimens approach *halifaxi* in colouration.

Male hypopygium ; ventral cornu of lateral plate of phallosome tapering and pointed ; median process pronounced and with a number of teeth ; lateral process more pointed than in the other species (fig. 9). Subapical lobe of side-piece usually with three bristles only.

In India it appears to be confined to the hills and has been found up to 6,000 ft. or more.

Type in the British Museum from Tokio, Japan (*Yamada*).

Localities in India :—

Western Himalayas ; Kasauli, 6,000 ft. (*Christophers* and *Barraud*).

Eastern Himalayas ; Kurseong, 5,000 ft., Mungpoo, 3,000 ft. September and October 1922 (*Barraud*).

Assam ; Shillong (*Jukes*, *Shortt*, and *Barraud*), Haflong, August 1922 (*Barraud*), Mikir Hills, January 1911 (*Christophers*).

Burma ; Kalaw, Shan States, 4,000 ft. (*Christophers*).

**Lutzia halifaxi** (Theo.)

*Culex halifaxii*, Theobald, Mon. Cul., Vol. III, 1903, p. 231.

*Culex multimaculosus*, Leicester, Cul. Malaya, 1908, p. 155.

*Lutzia halifaxii* (Theo.), Edwards, Bull. Ent. Res., Vol. XII, part 3, November 1921, p. 327.

This species is evidently closely related to *L. vorax*. The marking of the hind femur is very similar to that species but the dark scales are

usually more numerous. The abdominal tergites are often entirely dark, in other specimens there are a few whitish scales at the apices of the terminal segments, or there may be very narrow whitish apical bands. The position of the cross veins is usually as in *L. fuscana*. Penultimate segment of the male palpi with the integument and hairs pale on the apical half.

The male hypopygium resembles that of *L. vorax*, but the median process of the lateral plate of the phallosome is usually more pronounced, and the lateral process more rounded, (fig 10). Subapical lobe of side-piece with three, four, or even five strong bristles.

Type female of *C. halifaxii* in the British Museum from Dindings, Straits Settlements. This has been compared by Edwards with a series of Leicester's *C. multimaculosus*.

Specimens agreeing with the description of this species were taken by the writer at Nongpoh, Assam, in July 1922, and are in the Central Malaria Bureau collection, Kasauli. It has not been found in any other places in India, but is likely to occur in Burma.

EXPLANATION OF PLATE LXIII.

Drawings illustrating structure of the male hypopygia of *Lutzia* spp.

- Fig. 1. *Lutzia fuscana*. Ventral view of one side of the male hypopygium in a natural position (ninth segment hairs of side-piece, and clasper omitted).
- sp. side-piece, ventral surface.  
 sl. subapical lobe.  
 exb. external border.  
 db. dorsal border.  
 ib. internal border  
 lp. lateral plate of phallosome.  
 pp. parameral plate  
 ba. basal apodeme.  
 as. ventro-lateral plate of anal segment.  
 la. lateral arm of ventro-lateral plate.  
 cr. crown of ventro-lateral plate.  
 c<sup>1</sup>. basal part of ventro-lateral plate (*vide* also fig. 6).  
 c<sup>2</sup>. chitinised connection between side-piece and basal apodeme.
- „ 2. „ „ Clasper (slide preparation).  
 „ 3. „ „ Processes of subapical lobe of side-piece (slide preparation).  
 „ 4. „ „ Parameral plate, side view (slide preparation).  
 „ 5. „ „ Basal apodeme, side view „ „  
 „ 6. „ „ Plates of anal segment, side view.  
 vlp. ventro-lateral plate  
 cr. crown of ditto.  
 dp. dorsal plate  
 la. lateral arm of ventro-lateral plat  
 c<sup>1</sup>. basal portion „ „ „  
 t. point of connection with ninth tergite.  
 b. point of connection with basal apodeme.  
 ph. point of connection with phallosome.
- „ 7. „ „ Lateral plate of phallosome side view (slide preparation).  
 vc. ventral cornu.  
 mp. median process.  
 lp. lateral process.
- „ 8. *Lutzia raptor*. Lateral plate of phallosome, side view (slide preparation).  
 „ 9. *Lutzia vorax*. Ditto.  
 „ 10. *Lutzia hakifazi*. Ditto

PLATE LXIII.



FIG. 2.

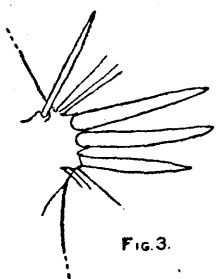


FIG. 3.



FIG. 4.

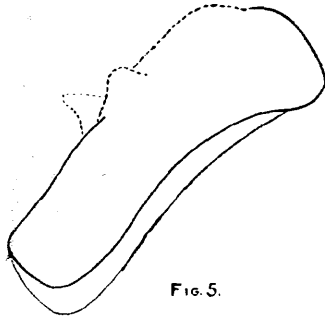


FIG. 5.

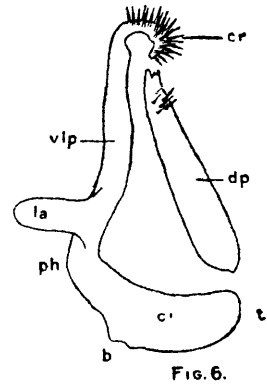


FIG. 6.

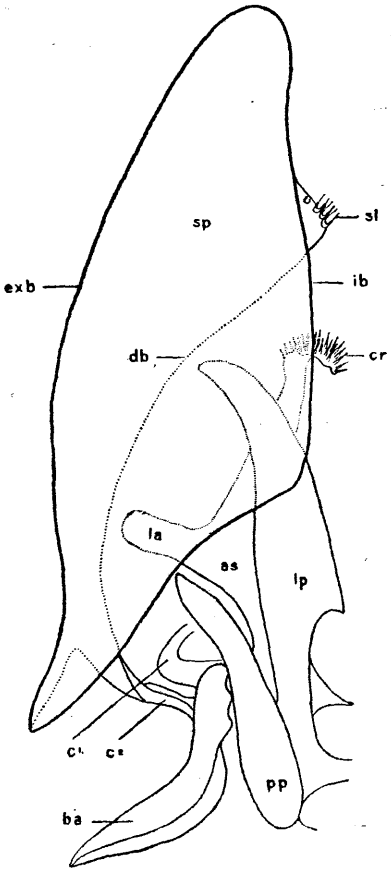


FIG. 1.

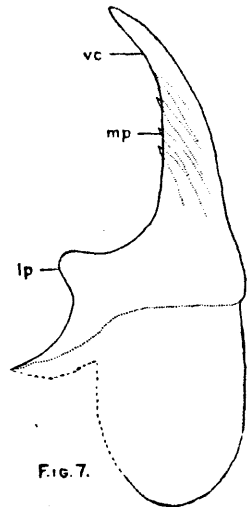


FIG. 7.

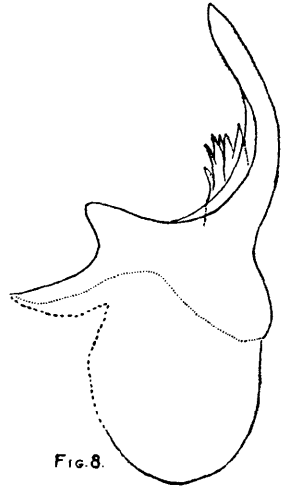


FIG. 8.

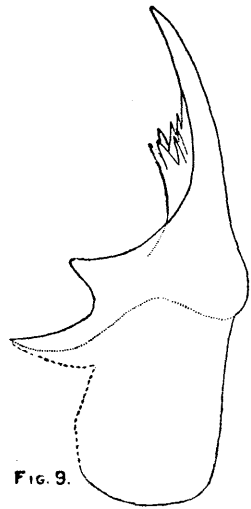


FIG. 9.

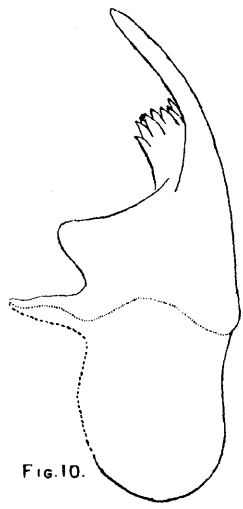


FIG. 10.

10 m m.