

RECORDS OF MOSQUITOES (DIPTERA : CULICIDAE) FROM MANIPUR
GENUS—CULEX

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INTRODUCTION

The genus *Culex* is of immense medical importance because it includes certain proved vectors i.e. *Culex quinquefasciatus* for bancroftian filariasis and *C. tritaeniorhynchus* for Japanese encephalitis. In addition to it, some members viz., *C. gelidus*, *C. fuscocephala*, *C. vishnui*, and *C. pseudovishnui* have been proved to be probable or potential vectors of Japanese encephalitis.

The mosquito-borne diseases are on increase in India, and the state of Manipur remained no exception to it. The state faced an epidemic of Japanese encephalitis during 1982 (Chakraborty *et al.*, 1984). In spite of continuance of the fatal cause of these diseases in the state, the genus *Culex* was not studied earlier with due precision. The recorded number of species under the genus stands at 11 (Malhotra *et al.*, 1983).

In view of the above, periodic surveys were made during 1983 to 1985 from far and wide localities of the state. The present communication deals with the distribution records of the genus *Culex* in the state. The methods used for collection, rearing procedure, and topographic description & climate of the study area have been presented earlier (Rajput and Singh, 1986). The identification was made mainly on the basis of adult characters, but the genital characters and characters of immatures were also taken into consideration whenever those forms were available. The present work follows Barraud (1934), Bram (1967), Reuben (1969) and Sirivanakarn (1276, 1977a & b) for identification ; Knight and Stone (1977) for classification & nomenclature.

Collection Records :

1. ***Culex bitaeniorhynchus* Giles**

Culex bitaeniorhynchus Giles, 1901, *J. Bomb. Nat. Hist. Soc.* 13 : 607 ; Barraud, 1934 : 391-394 ; Knight and Stone, 1977 : 203.

The species has its wide range of distribution in Oriental, Palearctic, Ethiopian and Australian region. Recorded from all over India.

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Present records : Manipur : *Canchipur* (785 m.)—24 —♂. 33 ♀♀, (2 Oct. '84) larvae were reared from a paddy-field. *Chandel* (1,500 m.)—1 ♂ 1 ♀ (22 Oct. '85) from forest-vegetation. *Chingmeirong* (785 m.)—2 ♂♂ (11 Sept. '83-29 Nov. '83), 29 ♂♂, 17 ♀♀ (27 Jun. '84—14 Oct. '84) were collected from shrubby vegetation ; 1 ♀ (15 Mar. '84) larva was reared from a pond. *Geljang* (850 m.)—1 — (27 Nov. '84) from shrubby vegetation. *Khongampat* (785 m.)—2 ♂♂, 1 ♀ (27 Nov. '83), 18 ♂♂, 16 ♀♀ (12 Aug. '84) from herb vegetation ; 1 ♂, 2 ♀♀ (12 Aug. '84) larvae were reared from a paddy fields. *Khurkhul* (830 m.)—1 ♂, 1 ♀ (29 Jan. '84) from herb vegetation. *Langol-hill* (785 m.)—1 ♂ (29 Jul. '84) from pit-shelter in a drain. *Mantripukhri* (785 m.)—2 ♀♀ (7 Nov. '83—19 Nov. '83), 5 ♂♂ (27 Jul '84—14 Oct. '84) attracted over bulb-light ; 3 ♀♀ (9 Jul '84—26 Jul. '84) from bovine-bait ; 2 ♀♀ (10 Jul. '84—22 Aug. '84) from cattle-shed ; 1 ♀ (27 Jul. '84) from human-bait. *Moreh* (150 m.)—2 ♂♂, 1 ♀ (18 Aug. '84) from shrubby vegetation ; 3 ♂♂ (18 Aug. '84) from human-bait ; 1 ♂ (19 Aug. '84) from nala margin-groove in forest ; 1 ♂, 3 ♀♀ (19 Aug. '84) from herb vegetation. *Pheidinga* (900 m.)—1 ♀ (12 Aug. '84) from shrubby vegetation. *Tamenglong* (1,200 m.)—1 ♀ (8 Sept. '84) from shrubby vegetation. Associative breeders were *Anopheles nigerrimus*, *A. annularis* and *Culex pseudovishnui*.

2. *Culex edwardsi* Barraud

Culex edwardsi Barraud, 1923, *Indian. J. Med. Res.* 11 : 507 ; Barraud, 1934 : 397-398 ; Knight and Stone, 1977 : 207.

The species has its range of distribution in Oriental and Australian region. From India, it has been reported from Madhya Pradesh, Manipur, Meghalaya and Tamil Nadu.

Present records : Manipur : *Langol-hill* (850 m.)—1 ♂ and 1 ♀ (26 Jan. '84) from herb vegetation and pit-shelter respectively ; 1 ♂, 1 ♀ (19 Feb. '84) from shrubby vegetation. *Mantripukhri* (785 m.)—1 ♂, 1 ♀ (13 Feb. '84) from herb vegetation. *Pheidinga* (900 m.)—3 ♂♂ (29 Jan. '84) from herb vegetation.

3. *Culex epidesmus* (Theobald)

Taeniorhynchus epidesmus Theobald, 1910, *Rec. Indian Mus.* 4 ; 22 : Barraud, 1934 : 389-391 ; Knight and Stone, 1977 : 207.

This is an Oriental species recorded from all over India, Bangladesh, Nepal, Pakistan and Sri Lanka.

Present records : Manipur : *Chingmeirong* (785 m.)—1 ♀ (11 Sept. '83) from shrubby vegetation. *Jiribam* (150 m.)—1 ♂ (7 Oct. '84) from bovine-bait.

4. *Culex fuscocephala* (Theobald)

Culex fuscocephala Theobald, 1907, *Monogr. Cul.* 4 : 420 ; Barraud, 1934 : 424-426 ; Knight and Stone, 1977 : 208.

The species is known from Oriental and eastern parts of Palearctic region. It has been recorded from all over Indian region.

Present records : Manipur : *Boljang* (775 m.)—1 ♂ (8 Oct. '83) from shrubby forest. *Bungmul* (850 m.)—2 ♀ ♀ (27 Nov. '84) from herb vegetation. *Chingmeirong* (785 m.)—16 ♂ ♂, 6 ♂ ♂ (11 Sept. '83—4 Dec. '84), 49 ♂ ♂, 24 ♀ ♀ (22 Jan. '84—25 Sept. '84) from shrubby vegetation of *Quercus acutissima* ; 3 ♀ ♀ (7 Jan. '84) from herb vegetation ; 10 ♂ ♂, 8 ♀ ♀ (10 Oct. '83) larvae were reared from a road side pool ; 2 ♂ ♂, 1 ♀ (14 Oct. '83) larvae reared from a rainy-pit ; 23 ♂ ♂, 19 ♀ ♀ (23 Oct. '83) larvae were reared from cart-trac ; 1 ♂ (6 Nov. '83) larvae reared from Foot-prints. *Churachandpur* (850 m.)—1 ♂, 1 ♀ (8 Oct. '83) larvae were reared from road side pool. *Gwaltabi* (785 m.)—1 ♂, 2 ♀ ♀ (19 Nov. '84) from shrubby vegetation. *Jiribam* (150 m.)—4 ♀ ♀ (7 Oct. '84) from bovine-baits. *Khongampat* (785 m.)—1 ♂ (27 Nov. '83), 9 ♂ ♂, 1 ♀ (12 Aug. '84) from herb vegetation. *Khongsong* (650 m.)—1 ♀ (9 Sept. '84) larva was reared from road-side rainy pool. *Koubru-leikha* (1, 040 m.)—1 ♂ (12 Aug. '84) from shrubby vegetation. *Kwakta* (760 m.)—3 ♂ ♂, 5 ♀ ♀ (8 Oct. '83) from shrubby vegetation. *Mantripukhri* (785 m.)—16 ♀ ♀ (21 Oct. '83—4 Dec. '83) from cattle-shed ; 14 ♀ ♀ (23 Oct. '83—29 Nov. '83), 34 ♀ ♀ (8 Apr. '84—14 Oct. '84) from human-bait ; 1 ♀ (7 Nov. '83), 2 ♂ ♂, 28 ♀ ♀ (13 Mar. '84—21 Oct. '84) attracted to bulb-light ; 90 ♀ ♀ (14 Nov. '83—26 Nov. '83), 567 ♀ ♀ (25 Feb. '84—29 Oct. '84) from bovine-baits ; 2 ♀ ♀ (28 Nov. '83) from human dwellings. *Mao* (1, 850 m.)—1 ♂, 1 ♀ (8 Sept. '85) larvae reared from rainy-pool. *Moreh* (150 m.)—3 ♀ ♀ (18 Aug. '84) from human-bait ; 8 ♂ ♂, 9 ♀ ♀ (18 Aug. '84) larvae reared from road-side rainy pits ; 1 ♀ (19 Aug. '84) larvae reared from a rainy pool in forest. *Nungba* (750 m.)—1 ♀ (8 Oct. '84) from bovine-bait. *Tamenglong* (1, 200 m.)—1 ♀ (8 Sept. '84) from bovine-bait. *Tongou-Lonkoy* (820 m.)—1 ♂, 1 ♀ (9 Ju. '84) from herb vegetation. *Zaphou* (1,000 m.)—2 ♀ ♀ (21 Oct. '85—22 Oct. '85) from human-bait. Associative breeders were *Anopheles nigerrimus*, *A. kochi*, *A. vagus*, *Aedes caecus* and *Culex pseudovishuni*.

5. *Culex gelidus* Theobald

Culex gelidus Theobald, 1901, *Monogr. Cul.* : 20 ; Barraud, 1934 : 407-409 ; Knight and Stone, 1977 : 209.

This species was known to be distributed in Oriental region, South and South-Western palearctic region. It also extends upto New Guinea in Australian region. Recorded from all-over India.

Present records : Manipur : *Bungmul* (850 m.)—1 ♀ (27 Nov. '84), from herb vegetation. *Chingmeirong* (785 m.)—52 ♂ ♂, 34 ♀ ♀, (11 Sept. '83—4 Dec. '83), 33 ♂ ♂,

27 ♀ ♀ (9 Jun. '84—25 Sept. '84) from shrubby vegetation. *Jiribam* (150 m.)—1 ♀ (7 Oct. '84) and 1 ♀ (7 Oct. '84) from herb vegetation and bovine-bait respectively. *Khonghampat* (785 m.)—2 ♂ ♂, 1 ♀ (10 Sept. '83) from herb vegetation. *Mantripukhri* (785 m.)—18 ♀ ♀ (12 Sept. '83—31 Oct. '83), 3 ♀ ♀ (15 Sept. '84—15 Oct. '84) collected from cattle-shed ; 5 ♀ ♀ (11 Oct. '83—13 Nov. '83), 1 ♀ (14 Jul. '84), 4 ♂ ♂, 28 ♀ ♀ (11 Jul. '84—21 Oct. '84) attracted to bulb-light ; 4 ♀ ♀ (23 Oct. '83—30 Oct. '83), 2 ♀ ♀ (27 Jul. '84—14 Oct. '84) from human bait ; 14 ♀ ♀ (14 Nov. '83), 501 ♀ ♀ (10 Ju. '84—29 Oct. '84) from bovine baits. *Moreh* (150 m.)—1 ♀ (19 Aug. '84) from shrubby forest. *Tongou-Lonkoy* (820 m.)—1 ♀ (9 Jul. '84) from herb vegetation.

6. *Culex hutchinsoni* Barraud

Culex hutchinsoni Barraud, 1924, *Indian J. Med. Res.* 11 : 1261 ; Barraud, 1934 : 423-424 ; Knight and Stone, 1977 : 210.

The species has its range of distribution in Oriental region only. In India, it has been recorded from Manipur and Meghalaya.

Presents records : Manipur : *Khonghampat* (785 m.)—2 ♂ ♂ (16 Dec. '84) from herb vegetation.

7. *Culex infula* Theobald

Culex infula Theobald, 1901, *Monogr. Cul.* 1 : 370 ; Sirivanakarn, 1976, 12 (2) : 71-75 ; Knight, 1978 : 43-44.

The species comes under the category of Oriental endemic fauna. The species has been recorded from Assam, Maharashtra and Manipur.

Present records : Manipur : *Chingmeirong* (785 m.)—2 ♂ ♂, 1 ♀ (22 Aug. '84) from shrubby vegetation.

8. *Culex mimulus* Edwards

Culex mimulus Edwards, 1915, *Bull. Ent. Res.* 5 : 284 ; Barraud 1934 : 412 ; Knight and Stone, 1977 : 212.

This species has its range of distribution in Oriental, Palearctic and Australian region. It has been recorded from all over India.

Present records : Manipur : *Khurkhul* (830 m.)—1 ♂ (29 Jan. '84), from herb vegetation. *Langol-hill* (785 m.)—1 ♀ (19 Feb. '83) from shrubby vegetation. *Mantripukhri* (785 m.)—2 ♂ ♂ (25 Mar. '84) larvae reared from pond margin. *Moreh* (150 m.)—1 ♂, 6 ♀ ♀ (19 Aug. '84) larvae reared from rainy-pool in forest. *Nungba* (750 m.)—20 ♂ ♂, 9 ♀ ♀ (9 Oct. '84—8 Oct. '84) larvae reared from rainy-pool. *Tamenglong* (1, 200 m.)—3 ♂ ♂ (8 Sept. '84) from shrubby forest. Associated breeders were *Anopheles nigerrimus*,

A. annularis, *A. maculatus*, *A. maculatus* var. *willmorei*, *Aedes caecus* and *Culex pseudovishnui*.

9. *Culex pseudovishnui* Colless

Culex pseudovishnui Colles, 1957, *Ann. trop. Med. Parasit* : 51 ; Sirivanakarn, 1976, 12 (2) : 116 ; Knight and Stone, 1977 : 221.

This species has been recorded to be distributed all over Orient. It is recorded to be widely distributed all over India.

Present records : Manipur : *Boljang* (775 m.)—2 ♂♂ (8 Oct. '83) from shrubby forest. *Bullian* (775 m.)—2 ♀♀ (8 Oct. '83) from shrubby forest. *Chandel* (1,500 m.), 1 ♂, 2 ♀♀ (22 Oct. '85) from forest vegetation. *Chingmeirong* (785 m.)—109 ♂♂, 310 ♀♀ (11 Sept. '83—4 Dec. '83), 179 ♂♂, 85 ♀♀ (25 Mar. '84—14 Oct. '84) collected from shrubby vegetation of *Quercus acutissima*; 2 ♂♂, 1 ♀ (14 Oct. '83), 1 ♂ (25 Mar. '84) larvae were reared from rainy pits, 1 ♀ (14 Oct. '83) from road side pool; 1 ♀ (6 Nov. '83) from foot-prints; 34 ♂♂, 33 ♀♀ (15 Mar. '84—15 Oct. '84) reared from larvae from pond margins. *Geljang* (850 m.)—1 ♂, 2 ♀♀ (27 Nov. '84) larvae reared from a muddy-pit. *Gwaltabi* (785 m.)—2 ♂♂, 1 ♀ (19 Nov. '84) from shrubby vegetation. *Jiribam* (150 m.)—1 ♂, 2 ♀♀ and 1 ♀ (7 Oct. '84) from herb vegetation and bovine-bait respectively. *Kanglatongbi* (790 m.)—2 ♀♀ (12 Aug. '84) from herb vegetation. *Khongampat* (785 m.)—25 ♂♂, 4 ♀♀ (27 Nov. '83), 3 ♂♂, 2 ♀♀ (29 Jan. '84—12 Aug. '84) from herb vegetation. *Koubru-leikha* (1,040 m.)—3 ♂♂ (12 Aug. '84) from shrubby vegetation. *Kwakta* (760 m.)—3 ♂♂, 8 ♀♀ (8 Oct. '83) from mulberry shrubs. *Langol-hill* (785 m.)—5 ♂♂ (26 Jan. '84—29 Jul. '84) from pit shelters. *Mantripukhri* (785 m.)—15 ♀♀ (2 Oct. '83—31 Oct. '83), 5 ♀♀ (15 Sept. '84—15 Oct. '84) from cattle-shed, 1 ♂, 12 ♀♀ (11 Oct. '83—7 Nov. '83), 22 ♂♂, 81 ♀♀ (12 Jun. '84—1 Nov. '84) attracted to bulb-light, 40 ♀♀ (23 Oct. '83—15 Nov. '83), 68 ♂♂ (27 Mar. '84—26 Sept. '84) from human-bait; 2 ♂♂, 9 ♀♀ (14 Nov. '83—26 Nov. '83), 498 ♀♀ (6 Feb. '84—29 Oct. '84) from bovine-bait; 1 ♀ (15-Apr. '84) larva was reared from muddy-pit in a dried pond. *Mao* (1,850 m.)—1 ♀ (8 Sept. '85) from human-bait. *Moltam-hill* (820 m.)—1 ♂ (1 Nov. '84) from shrubby vegetation; 1 ♂, 2 ♀♀ (1 Nov. '84) larvae reared from meadows-pool. *Moreh* (150 m.)—2 ♀♀ (18 Aug. '84—19 Aug. '84) from shrubby vegetation; 8 ♀♀ (18 Aug. '84) from human-bait; 1 ♀ (19 Aug. '84) from nala margin pits, 1 ♂, 2 ♀♀ (19 Aug. '84) from herb vegetation. *Motbung* (1,025 m.)—2 ♂♂ (12 Aug. '84) from herb vegetation. *New-heaven* (1,600 m.)—1 ♀ (19 Nov. '84) larva was reared from a pit in paddy-field. *Nungba* (750 m.)—1 ♀ (8 Oct. '84) from bovine-bait. *Tongou Lonkoy* (820 m.)—1 ♂ (9 Jul. '84) from herb vegetation. *Toranglobi* (765 m.)—3 ♂♂, 1 ♀ (1 Nov. '84) larvae were reared from a road side pool. *Tuibang* (800 m.)—1 ♂ (8 Oct. '83) from herb vegetation. *Zaphou* (1,000 m.)—19 ♂♂ (21 Oct. '85) from human-bait. Associated breeder were *Anopheles barbirostris*, *A. annularis*, *A. subpictus*, *A.*

vagus, *Culex bitaeniorhynchus*, *C. fuscocephala*, *C. mimulus*, *C. tritaeniorhynchus*, *C. vishnui* and *C. malayi*.

10. *Culex quinquefasciatus* Say

Culex quinquefasciatus Say, 1823, *J. Acad. nat. Sci. Philad.* 3 : 10 ; Barraud, 1934 : 420-423 ; Knight, 1978 : 46.

This species is cosmotropical in distribution. It has been recorded from all over India.

Present records : Manipur : *Bungmul* (850 m.)—2 ♂♂, 2 ♀♀ (27 Nov. '84) from herb vegetation. *Chingmeirong* (785 m.)—4 ♂♂, 8 ♀♀ (11 Sept. '83), 34 ♂♂, 19 ♀♀ (22 Jan. '84-28 Jul. '84) from shrubby vegetation. *Churachandpur* (850 m.)—2 ♂♂ (1 Nov. '84) from herb vegetation. *Gwaltabi* (785 m.)—1 ♂ (19 Nov. '84) from shrubby vegetation. *Imphal* (785 m.)—6 ♀♀ (10 Oct. '84) from human dwellings, 2 ♂♂, 4 ♀♀ (1 Nov. '84) from cattle-shed. *Jiribam* (150 m.)—1 ♀ (7 Oct. '84) from cattle-shed, 2 ♂♂, 4 ♀♀ (7 Oct. '84) from discarded motor tyres, 1 ♀ (7 Oct. '84) from herb vegetation, 8 ♀♀ (8 Oct. '84) from human dwellings. *Kalinamei* (1,800 m.)—6 ♂♂, 7 ♀♀ (8 Sept. '85) larvae reared from road side drain. *Khongampat* (785 m.)—2 ♂♂, 3 ♀♀ (1 Feb. '84-16 Dec. '84) from herb-vegetation. *Khurkhul* (830 m.)—2 ♀♀ (29 Jan. '84) from herb-vegetation. *Kwakta* (760 m.)—1 ♂ (8 Oct. '83) from shrubby vegetation. *Mantripukhri* (785 m.)—18 ♂♂, 32 ♀♀ (12 Sept. '83-23 Dec. '83), 1 ♂, 1 ♀ (6 Jan. '84), 113 ♂♂, 280 ♀♀ (23 Jan. '84-15 Dec. '84) from cattle-shed, 9 ♀♀ (23 Oct. '83-29 Nov. '83), 116 ♀♀ (13 Feb. '84-14 Oct. '84) from human-baits, 2 ♂♂, 3 ♀♀ (7 Nov. '83-12 Nov. '83), 1 ♂, 11 ♀♀ (13 Mar. '84-21 Oct. '84) attracted to bulb-light, 1 ♀ (14 Nov. '83), 33 ♀♀ (24 Jan. '84-29 Oct. '84) from bovine-baits, 19 ♂♂, 18 ♀♀ (15 Nov. '83-23 Dec. '83), 184 ♂♂, 150 ♀♀ (11 Jan. '84-14 Oct. '84) from human dwellings, 6 ♂♂, 6 ♀♀ (6 Jan. '84-11 Feb. '84) from abandoned house, 8 ♂♂, 10 ♀♀ (23 Jan. '84) from wooden-logs, 4 ♀♀, 1 ♂ (13 Feb. '84) from herb-vegetation. *Moreh* (150 m.)—8 ♀♀ (18 Aug. '84) from human-baits, 29 ♂♂, 33 ♀♀ (19 Aug. '84) from human dwellings. *Mao* (1,850 m.)—1 ♂, 5 ♀♀ (9 Sept. '85) from human dwellings, 1 ♂ 1 ♀ (8 Sept. '85) larvae were reared from a rainy-pool, 10 ♂♂, 11 ♀♀ (9 Sept. '85) from discarded tar barrel. *Nungdalal* (1,100 m.)—1 ♂, 1 ♀ (7 Sept. '84) larvae reared from road side rainy-pool. *Tamenglong* (1,200 m.)—4 ♀♀ (9 Nov. '84) from human dwellings. *Tuibang* (800 m.)—1 ♂, 2 ♀♀ (8 Oct. '83) from herb vegetation. *Ukhrul* (2,000 m.)—5 ♂♂, 2 ♀♀ (7 Jul. '84) from herb vegetation, 1 ♀ (8 Jul. '84), larva was reared from rainy-pool. *Zaphou* (1,000 m.)—3 ♀♀ (21 Oct. '85), 2 ♂♂, 23 ♀♀ (22 Oct. '85) from human-bait. Associated breeders were *Anopheles maculatus*, *A. maculatus* var. *willmorei*, *A. vagus*, *Aedes aegypti*, *A. albopictus*, *Armigeris subalbatus*, *Culex sinensis*, *C. theleri*, *C. harrisoni*, *C. pallidothorax* and *C. fuscus*.

11. *Culex sinensis* Theobald

Culex sinensis Theobald, 1903, *Monogr. Cul.* 3 : 180 ; Barraud, 1934 : 394-395 ; Knight and Stone, 1977 : 222.

The species has wide distribution-range in Oriental and Palaearctic regions. In India, the species has been recorded from Assam, Bihar, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Orissa,

Present records : Manipur : *Chandel* (1,500 m.)—1 ♂ (22 Oct. '85) from mixed vegetation. *Chingmeirong* (785 m.)—26 ♂♂, 10 ♀♀ (27 Jun. '84—25 Sept. '84) collected from shrubby vegetation of *Quercus acutissima*. *Kalinamei* (1,800 m.)—2 ♂♂ (8 Sept. '85) larvae reared from road side drain. *Koubrou-leikha* (1,040 m.)—2 ♂♂, 2 ♀♀ (12 Aug. '84) from shrubby vegetation. *Kwakta* (760 m.)—2 ♂♂, 2 ♀♀ (8 Oct. '83) from shrubby vegetation. *Langol-hill* (785 m.)—2 ♂♂ (29 Jul. '84) from pit-shelter. *Mantripukhri* (785 m.)—1 ♀ (14 Nov. '83), 12 ♀♀ (23 Jun. '84—13 Oct. '84) from bovine-bait, 2 ♂♂, 8 ♀♀ (27 Jun. '84—23 Sept. '84) attracted to bulb-light, 3 ♂♂ (10 Jul. '84—23 Aug. '84) from human-bait. *Moreh* (150 m.)—2 ♀♀ (18 Aug. '84) from human-bait. *Phedinga* (900 m.)—2 ♂♂ (12 Aug. '84) from shrubby vegetation. *Tongou-Lonkoy* (820 m.)—1 ♂ (9 Jul. '84) from herb vegetation.

12. *Culex theleri* Theobald

Culex theleri Theobald, 1903, *Monogr. Cul.* 3 : 187 ; Barraud, 1934 : 416-418 ; Knight and Stone, 1977 : 225.

The wide distribution range of the species includes southern and eastern Ethiopian region, southern Palearctic region and northern Oriental region. In India, the species has been recorded from Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Punjab, Manipur and Nagaland.

Present records : Manipur : *Kalinamei* (1,800 m.)—4 ♂♂, 1 ♀ (8 Sept. '85) larvae reared from road side drain. *Ukhrul* (2,000 m.)—10 ♀♀ (7 Jul. '84) from herb vegetation, 3 ♂♂, 4 ♀♀ and 12 ♂♂ 2 ♀♀ (8 Jul. '84) larvae were reared from discarded motor tyres and rainy-pools respectively. Associated breeders were *Culex quinquefasciatus* and *C. sinensis*.

13. *Culex tritaeniorhynchus* Giles

Culex tritaeniorhynchus Giles, 1901, *J. Bomb. Nat. His. Soc.* 13 : 606 ; Barraud, 1934 : 404-406 ; Knight and Stone, 1977 : 226.

This species has a wide range of distribution in eastern Palearctic region ; Ethiopian region ; Mediterranean and Middle east ; Micronesia ; and Oriental region. It has been recorded from all over India including Andaman Island.

Present records : Manipur : *Chingmeirong* (785 m.)—30 ♂♂, 17 ♀♀ (11 Sept. '83—29 Nov. '83), 114 ♂♂, 48 ♀♀ (22 Jan. '84—25 Sept. '84) from shrubby vegetation, 1 ♂, 1 ♀ (30 Oct. '83) from herb vegetation. *Jiribam* (150 m.)—1 ♀ (7 Oct. '84) from cattle-shed, 8 ♀♀ (7 Oct. '84) from bovine-bait, 4 ♀♀ (7 Oct. '84) larvae were reared from rainy-pool. *Khongampat* (785 m.)—10 ♂♂, 3 ♀♀ (27 Nov. '83) 3 ♂♂, 2 ♀♀ (12 Aug. '84) from herb vegetation. *Koubru-leikha* (1,040 m.)—2 ♂♂ (12 Aug. '84) from shrubby vegetation. *Khurkhul* (830 m.)—2 ♀♀ (19 Jan. '84) from herb vegetation. *Kwakta* (760 m.)—4 ♂♂, 9 ♀♀ (8 Oct. '83) from shrubby vegetation. *Langol-hill* (785 m.)—12 ♂♂, 9 ♀♀ (29 Jul. '84) from pit-shelters. *Mantripukhri* (785 m.)—4 ♀♀ (12 Sept. '83—31 Oct. '83), 1 ♀ (22 Aug. '84) from cattle-shed, 5 ♀♀ (11 Oct. '83—7 Nov. '83), 13 ♂♂, 51 ♀♀ (13 Mar. '84—1 Sept. '84) attracted to bulb-light, 1 ♂, 19 ♀♀ (23 Oct. '83—14 Feb. '83). 35 ♀♀ (11 Mar. '84—14 Oct. '84) from human-bait, 4 ♀♀ (14 Nov. '83), 207 ♀♀ (25 Feb. '84—29 Oct. '84) from bovine-bait. 1 ♀ (13 Feb. '84) from herb-vegetation. *Mao* (1,850 m.)—1 ♀ (8 Sept. '85) from cattle-shed. *Moreh* (150 m.)—1 ♀ (19 Aug. '84) from shrubby vegetation. 1 ♀ (19 Aug. '84) from grooves at nala margins in forest, 2 ♀♀ (19 Aug. '84) from herb-vegetation. *Tongou-Lonkoy* (820 m.)—1 ♀ (9 Jul. '84) from herb vegetation. *Zaphou* (1,000 m.)—9 ♀♀ (21 Oct. '85—22 Oct. '15) from human-bait. Associated breeders *Anopheles nigerrimus*, *A. annularis* and *Culex pseudovishnui*.

14. *Culex vishnui* Theobald

Culex vishnui Theobald, 1901, *Monogr. Cul.* 1 : 355 ; Barraud, 1934 : 400-402 ; Knight and Stone, 1977 : 228.

This species is known from south and south western Palearctic region and oriental region. Recorded from all over Indian region, including Andaman Islands.

Present records : Manipur : *Chingmeirong* (785 m.)—1 ♀ (11 Sept. '83), 11 ♂♂, 24 ♀♀ (9 Jun. '84—14 Oct. '84) from *Quercus acutissima* plantation. *Kanglatongbi* (1,000 m.)—2 ♀♀ (12 Aug. '84) from herb vegetation. *Khongampat* (785 m.)—2 ♂♂, 1 ♀ (27 Nov. '83) from herb-vegetation. *Langol-hill* (735 m.)—4 ♂♂ (29 Jul. '84) from pit-shelter. *Mantripukhri* (785 m.)—1 ♂, 6 ♀♀ (13 Mar. '84—23 Sept. '84) attracted over bulb-light, 33 ♀♀ (4 Apr. '84—29 Oct. '84) from bovine-baits, 1 ♀ (25 Apr. '84) from human-bait. Associated breeders were *Anopheles nigerrimus* and *Culex pseudovishnui*.

15. *Culex whitmorei* (Giles)

Taeniorhynchus whitmorei Giles, 1904, *J. trop. Med.* 7 : 367 ; Barraud, 1934 : 406-407 ; Knight and Stone, 1977 : 228.

The species is known from Oriental, Palearctic and Australian region. Recorded from all over India,

Present records : Manipur : *Boljang* (775 m.)—1 ♀ (8 Oct. '83) from shrubby-vegetation. *Chandel* (1,500 m.)—1 ♀ (22 Oct. '85) from mixed vegetation. *Chingmeirong* (785 m.)—5 ♂♂, 3 ♀♀ (18 Sept. '83—4 Dec. '83), 3 ♂♂, 13 ♀♀ (14 Apr. '84—25 Sept. '84) from shrubby vegetation. *Geljang* (850 m.)—1 ♀ (27 Nov. '84) from shrubby vegetation. *Jiribam* (150 m.)—4 ♀♀ (7 Oct. '84) from bovine-bait. *Kanglatongbi* (1,000 m.)—2 ♀♀ (12 Aug. '84) from herb vegetation. *Khongampat* (785 m.)—1 ♂ (27 Nov. '83), 7 ♂♂, 9 ♀♀ (12 Aug. '84—16 Dec. '84) from herb vegetation. *Koubru-leikha* (1,040 m.) 1 ♂ (12 Aug. '84) from shrubby vegetation. *Kwakta* (760 m.)—3 ♂♂, 18 ♀♀ (8 Oct. '83) mulberry plantation. *Mantripukhri* (758 m.)—6 ♀♀ (11 Oct. '83—19 Oct. '83), 5 ♂♂, 4 ♀♀ (11 Jul. '84—23 Sept. '84) attracted to bulb-light, 8 ♀♀ (23 Oct. '83), 1 ♀ (24 Jun. '84), 20 ♀♀ (10 Jul. '84—14 Oct. '84) from human-bait, 17 ♀♀ (10 Jun. '84—13 Oct. '84) from bovine-bait, 1 ♀ (14 Oct. '84) from human-dwellings, 1 ♂ (19 Nov. '84) from shrubby vegetation. *Moreh* (150 m.)—2 ♀♀ (18 Aug. '84) from human-bait. *Tongou-Lonkoy* (820 m.)—1 ♀ (9 Jul. '84) from herb vegetation. *Zaphou* (1,000 m.)—1 ♀ (21 Oct. '85) from human dwellings, 2 ♀ (21 Oct. '85) from human-bait.

16. *Culex harrisoni* Sirivanakarn

Culex harrisoni Sirivanakarn, 1977, *Mosq. Syst.* 9 (2): 102-104.

The species was known earlier from Thailand only.

Present records : Manipur : *Mao* (1,850 m.)—1 ♂ (8 Sept. '85) larva was reared from a discarded motor-tyre, 1 ♂, 1 ♀ (9 Sept. '85) larvae reared from a discarded tar-barrel. Associated breeders were *Culex quinquefasciatus*, *C. pallidothorax* and *Uranotaenia bimaculata*.

17. *Culex nigropunctatus* Edwards

Culex nigropunctatus Edwards, 1926, *Bull. Ent. Res.* 17: 121; Barraud, 1934: 383-385; Knight and Stone, 1977: 231.

The species has its distribution in Oriental region with northward extension upto Ryukyu-Retto. In India, It has been recorded from Andhra Pradesh, Assam Karnataka, Manipur, Meghalaya, Nagaland and Tamil Nadu.

Present records : Manipur : *Chingmeirong* (785 m.)—1 ♂ (22 Aug. '84) from shrubby vegetation. *Mantripukhri* (785 m.)—1 ♂ (27 Jul. '84) attracted to bulb-light.

18. *Culex pallidothorax* Theobald

Culex pallidothorax Theobald, 1905, *J. econ. Biol.* 1: 32; Barraud, 1934: 381-382; Knight and Stone, 1977: 232.

This species has its distribution range in Orient, south western Palearctic region and upto New Guinea in Australian region. Recorded from all over Indian region,

Present records : Manipur : *Khongampat* (785 m.)—1 ♂, 1 ♀ (27 Nov. '83) from herb vegetation. *Mao* (1,850 m.)—2 ♀ ♀ (8 Sept. '85) collected from a pigsty, 3 ♂ ♂, 1 ♀ (8 Sept. '85) larvae were reared from a discarded motor-tyre, 1 ♀ (8 Sept. '85) larva was reared from a tree-hole, 1 ♀ (9 Sept. '85) larva was reared from a discarded tar-barrel. Associated breeders were *Culex quinquefasciatus*, *C. harrisoni* and *Uranotaenia bimaculata*.

19. *Culex brevipalpis* (Giles)

Stegomyia brevipalpis Giles, 1902, *Hand book*, 2nd ed : 384 ; Barraud, 1934 : 348-351 ; Knight and Stone, 1977 : 234.

This species has its distribution in Oriental region with the extension upto New Guinea in Australian region and north-ward upto Ryukyu Islands in Palearctic region. The species is common in India except the north western part of the country.

Present records : Manipur : *Chingmeirong* (785 m.)—1 ♀ (4 Dec. '83), 1 ♀ (12 Jul. '84) from shrubby-vegetation. *Moreh* (150 m.)—37 ♂ ♂, 42 ♀ ♀ (18 Aug. '84—19 Aug. '84) from tree-holes, 1 ♂ (18 Aug. '84) from shrubby-vegetation. *Nungba* (750 m.)—2 ♂ ♂, 1 ♀ (8 Oct. '84) from tree-hole, 12 ♂ ♂, 4 ♀ ♀ (9 Oct. '84) larvae were reared from a discarded rain-gauze with turbid, dark coloured water having decaying leaves. Associated breeders were *Aedes albopictus* and *Armigeres subalbatus*.

20. *Culex malayi* (Leicester)

Aedes malayi Leicester, 1908, *Stud. Inst. Med. Res. F. M. S.* : 184 ; Barraud, 1934 : 358-359 ; Knight and Stone, 1977 : 237.

This has been recorded from China, Hong Kong, New Guinea and Oriental region. The species has its distribution all over India including Andaman Islands.

Present records : Manipur : *Chingmeirong* (785 m.)—16 ♂ ♂, 5 ♀ ♀ (18 Sept. '83—4 Dec. '83), 1 ♂, 4 ♀ ♀ (12 Jul. '84—14 Oct. '84) were collected from shrubby vegetation of *Quercus acutissima*, 1 ♀ (25 Aug. '84) larva was reared from a pond-margin. *Churachandpur* (850 m.)—1 ♂ (1 Nov. '84), from herb-vegetation. *Khongampat* (785 m.)—1 ♀ (16 Dec. '84) from herb-vegetation. *Mantripukhri* (785 m.)—3 ♂ ♂, 3 ♀ ♀ (12 Nov. '83—20 Nov. '83), 7 ♂ ♂, 4 ♀ ♀ (15 Aug. '84—8 Nov. '84) were attracted to bulb-light. *Moreh* (150 m.)—1 ♂ (19 Aug. '84) was collected from a hole at nala margin in dense forest. Associated breeders were *Anopheles nigerrimus*, *A. annularis* and *Culex pseudovishuni*.

21. *Culex bengalensis* Barraud

Culex bengalensis Barraud, 1934 : 371 ; Colless, 1965 : 293 ; Bram, 1967 : 83 ; Knight 1978 : 51.

Recorded from China, Indonesia, Malaysia and Thailand. In India, it is known from Manipur, Meghalaya and West Bengal.

Present records : Manipur : *Geljang* (820 m.)—1 ♂ (27 Nov. '84) collected from shrubby-forest.

22. *Culex cinctellus* Edwards

Culex cinctellus Edwards, 1922, *Indian. J. Med. Res.* 10 : 281 ; Barraud, 1934 ; 366-367 ; Sirivanakarn, 1977 : 33 ; Knight and Stone, 1977 : 241.

The species has its distribution in Oriental and north western Palearctic region. Recorded from Kerala and Manipur in India.

Present records : Manipur : *Chingmeirong* (785 m.)—2 ♂♂ (2 Oct. '83), 2 ♂♂ (9 Jun. '84) from *Quercus acutissima* plantation.

23. *Culex infantulus* Edwards

Culex infantulus Edwards 1922, *Indian J. Med. Res.* 10 : 287 ; Sirivanakarn, 1977 : 26 ; Knight and Stone, 1977 : 243.

The species has its distribution range in Oriental and Palearctic region. The species is known from Andhra Pradesh, Kerala and Manipur in India.

Present records : Manipur : *Moreh* (150 m.)—1 ♂ (18 Aug. '84) from tree-hole, 13 ♂♂, 2 ♀♀ (19 Aug. '84) from a hole at nala margin in forest.

24. *Culex minor* Leicester

Culex minor Leicester, 1908, *Cul. Malaya* : 126 ; Barraud, 1934 : 370-372 ; Knight 1978 : 53.

The species is widely distributed in Oriental region and west Irian. In India, it has been recorded from Andaman Islands, Bihar, Himachal Pradesh, Maharashtra, Manipur, Meghalaya, Orissa and West Bengal.

Present records : Manipur : *Mao* (1,850 m.)—1 ♂ (8 Sept. '85) larva was reared from a tree-hole.

25. *Culex rubithoracic* Leicester

Culex rubithoracic Leicester, 1908, *Cul. Malaya* : 119 ; Barraud, 1934 : 367-368 ; Sirivanakarn, 1977 : 37 ; Knight and Stone, 1977 : 246.

The species is known from Oriental and Palearctic region. In India, recorded from Assam, Karnataka, Manipur, and West Bengal.

Present records : Manipur : *Bungmul* (850 m.)—1 ♀ (27 Nov. '84) from herbs in a trench. *Chingmeirong* (785 m.)—5 ♂♂, 4 ♀♀ (11 Sept. '83—29 Nov. '83) from shrubby vegetation. *Geljang* (850 m.)—1 ♂ (27 Nov. '84) from shrubby forest of *Lithocarpus dealbata*. *Mantripukhri* (785 m.)—1 ♀ (10 Sept. '84) attracted over bulb-light.

26. *Culex fuscanus* Wiedemann

Culex fuscanus Wiedemann, 1820, *Dipt. Exot.* 1 : 9 ; Barraud, 1934 : 341-343 ; Delfinado, 1966 : 97
Knight and Stone, 1977 : 248.

The species has its wide distribution range in Oriental, Palearctic and Australian region. It has been recorded from all over Indian region.

Present records : Manipur : *Chingmeirong* (785 m.)—7 ♂♂, 2 ♀♀ (23 Oct. '83-25 Dec. '83), 15 ♂♂, 5 ♀♀ (27 Jun. '84-25 Sept. '84) from shrubby vegetation. *Koubruleikha* (1,040 m.)—1 ♂ (12 Aug. '84) from shrubby vegetation. *Mantripukhri* (785 m.)—1 ♀ (13 Nov. '83), 2 ♀♀ (23 Sept. '84-20 Oct. '84) from bulb-light, 1 ♀ (9 Oct. '83) larva was reared from a tape-water pit. *Tamenglong* (1,200 m.)—3 ♂♂, 1 ♀ (8 Sept. '84) larva was reared from a discarded motor-tyre with heavy decaying of animal skin. Associated breeders were *Aedes aegypti*, *A. albopictus*, *Armigeres subalbatus* and *Culex quinquefasciatus*.

27. *Culex halifaxi* Theobald

Culex halifaxi Theobald, 1903, *Monogr. Cul.* 3 : 231 ; Barraud, 1934 : 344-345 ; Knight and Stone, 1977 : 249.

The species is known from Oriental, Australian and Palearctic region. In India, it has been recorded from Assam, Himachal Pradesh, Karnataka, Madhya Pradesh, Meghalaya, Manipur, Sikkim, Tamil Nadu, Uttar Pradesh and West Bengal.

Present records : Manipur : *Moreh* (150 m.)—1 + (19 Aug. '84) from shrubby vegetation. *Ukhrul* (2,000 m.)—2 ♂♂ (7 Jul. '84-8 Jul. '84) larvae were reared from a discarded motor-tyre. Associated breeder was *Anopheles gigas*.

SUMMARY

The extensive survey during 1983 to 1985 from Manipur state shows the presence of 27 species under the genus *Culex*. The recorded species are *Culex bitaeniorhynchus*, *C. edwardsi*, *C. epidesmus*, *C. fuscocephala*, *C. gelidus*, *C. hutchinsoni*, *C. infula*, *C. mimulus*, *C. pseudovishnui*, *C. quinquefasciatus*, *C. sinensis*, *C. tritaeniorhynchus*, *C. vishnui*, *C. whitmorei*, *C. harrisoni*, *C. nigropunctatus*, *C. pallidothorax*, *C. brevipalpis*, *C. malayi*, *C. bengalensis*, *C. cinctellus*, *C. infantulus*, *C. mtnor*, *C. rubithoracic*, *C. fuscanus* and *Cx. halifaxi*. The present communication includes the distribution record of these species.

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