

A CHECKLIST OF MOSQUITOES (DIPTERA: CULICIDAE) OF PONDICHERRY, INDIA WITH NOTES ON NEW AREA RECORDS

A. R. RAJAVEL, R. NATARAJAN AND K. VAIDYANATHAN

Vector Control Research Centre (ICMR), Pondicherry 605 006, India

ABSTRACT. A checklist of mosquito species for Pondicherry, India, is presented based on collections made from November 1995 to September 1997. Mosquitoes of 64 species were found belonging to 23 subgenera and 14 genera, *Aedeomyia*, *Aedes*, *Anopheles*, *Armigeres*, *Coquillettidia*, *Culex*, *Ficalbia*, *Malaya*, *Mansonia*, *Mimomyia*, *Ochlerotatus*, *Toxorhynchites*, *Uranotaenia*, and *Verrallina*. We report 25 new species for Pondicherry.

KEY WORDS Mosquitoes, check list, new area records, Pondicherry, India

INTRODUCTION

Documentation of species is a critically important component of biodiversity studies and has great significance in conservation of genetic resources as well as control of pests and vectors. In India, mosquito fauna of several states has been documented, but comprehensive information on species diversity is not available for Pondicherry. A recent update on the distribution of *Aedini* mosquitoes in India by Kaur (2003) included all the states except Pondicherry. The 14 species of mosquitoes collected by Nair (1960) during the filarial survey in Pondicherry settlement is the earliest known record of the mosquito fauna of Pondicherry. The record was upgraded to 43 species through collections made from 1976 to 1981 (Vector Control Research Center [VCRC], unpublished data). However, except for the mosquito faunistic survey done in 1977, the other collections were mostly related to investigation of vector-borne diseases and hence mainly focused on vector species. Here we report on the results of a systematic survey conducted over 2 years to document the mosquito fauna of the Pondicherry region, between 11°46' and 12°15'N latitude, and between 79°36' and 79°53'E longitude. It is bounded by the Bay of Bengal, Cuddalore, and Villupuram districts of Tamil Nadu State. Pondicherry, which is formed of 6 communes and the old town, is not a contiguous area, but is interspersed within the 2 districts of Tamil Nadu. The layout of Pondicherry presents a peculiar picture of territorial jurisdiction and may be the only one of its kind in India. The region is flat and intersected by deltaic channels of the rivers Gingee and Ponnaiyar forming the 2 main drainage basins. The total area of Pondicherry is 293 km². The main soil types are red ferralitic, black clayey, and coastal alluvium. The water table is very high in most parts of this region. The climate is characterized by a yearly range of temperature (average low = 22°C and average high = 37°C), humid weather (above 70% relative humidity), and moderate (average of 115 cm) rainfall. The summer lasts from March to June, followed by the period of southwest monsoon that lasts to September. The months of October and November constitute the main northeast monsoon

season. The period from December to February is relatively cool.

MATERIALS AND METHODS

Mosquito surveys were made from November 1995 to September 1997. Each of the 6 communes, Ariankuppam, Bahour, Mannadipet, Nettapakkam, Ozhukarai, and Villianur, were considered as distinct units to ensure complete coverage of the region, and collections were made in a total of 97 villages among these and in the old town of Pondicherry. Immatures were collected from all types of larval breeding sources, ranging from ground habitats to container habitats, both natural and man made. Sampling devices, like dippers, pipettes, siphons, and buckets, appropriate to the type of larval habitat were used. Adult collections were done in human dwellings, cattle sheds, and among vegetation using either an oral or mechanical aspirator.

Larvae were reared to adulthood in the laboratory and identification was based mainly on adult characters and, wherever necessary, associated larval and pupal skins were mounted for confirmation. Male and female genitalia were also mounted in a few cases for the same purpose. Species determinations were made using keys (Christophers 1933; Barraud 1934; Bram 1967; Delfinado 1968; Reinert 1970, 1973; Tyson 1970; Huang 1972, 1977, 1979; Sirivanakarn 1972, 1976, 1977; Abercombe 1977). Voucher specimens for all species recorded were mounted and deposited in the mosquito museum of the Culicid Biodiversity Cell at the VCRC, Pondicherry, India.

RESULTS AND DISCUSSION

Mosquitoes of 64 species belonging to 23 subgenera and 14 genera were recorded (Table 1). Genera included *Aedeomyia*, *Aedes*, *Anopheles*, *Armigeres*, *Coquillettidia*, *Culex*, *Ficalbia*, *Malaya*, *Mansonia*, *Mimomyia*, *Ochlerotatus*, *Toxorhynchites*, *Uranotaenia*, and *Verrallina*. Of the 64 species recorded, 25 are new records for Pondicherry. The three genera *Aedes*, *Anopheles*, and *Culex* were more predominant, with 15, 12, and 21 species re-

Table 1. List of culicid species recorded in Pondicherry, India.

<i>Aedeomyia (Aedeomyia) catasticta</i> Knab ¹
<i>Aedes (Aedimorphus) jamesi</i> (Edwards)
<i>Ae. (Adm.) pallidostriatus</i> (Theobald) ¹
<i>Ae. (Adm.) pipersalatus</i> (Giles) ¹
<i>Ae. (Adm.) vexans</i> Meigen
<i>Ae. (Christophersomyia) annulirostris</i> (Theobald) ¹
<i>Ae. (Chr.) thomsoni</i> (Theobald) ¹
<i>Ae. (Diceromyia) ramachandrai</i> Reuben ¹
<i>Ae. (Dic.) reginae</i> Edwards ¹
<i>Ae. (Fredwardsius) vittatus</i> (Bigot)
<i>Ae. (Neomelaniconion) lineatopennis</i> (Ludlow)
<i>Ae. (Stegomyia) aegypti</i> (Linnaeus)
<i>Ae. (Stg.) albopictus</i> (Skuse)
<i>Ae. (Stg.) krombeini</i> Huang ¹
<i>Ae. (Stg.) novalbopictus</i> Barraud ¹
<i>Ae. (Stg.) w-albus</i> (Theobald)
<i>Anopheles (Anopheles) barbirostris</i> Van der Wulp
<i>An. (Ano.) nigerrimus</i> Giles
<i>An. (Ano.) peditaeniatus</i> (Leicester) ¹
<i>An. (Cellia) annularis</i> Van der Wulp
<i>An. (Cel.) culicifacies</i> Giles
<i>An. (Cel.) jamesi</i> Theobald
<i>An. (Cel.) pallidus</i> Theobald
<i>An. (Cel.) stephensi</i> Liston
<i>An. (Cel.) subpictus</i> Grassi
<i>An. (Cel.) tessellatus</i> Theobald
<i>An. (Cel.) vagus</i> Doenitz
<i>An. (Cel.) varuna</i> Iyengar
<i>Armigeres (Armigeres) subalbatus</i> (Coquillett)
<i>Coquillettidia (Coquillettidia) crassipes</i> (Van der Wulp)
<i>Culex (Culex) bitaeniorhynchus</i> Giles
<i>Cx. (Cux.) fuscocephala</i> Theobald
<i>Cx. (Cux.) gelidus</i> Theobald
<i>Cx. (Cux.) hutchinsoni</i> Barraud ¹
<i>Cx. (Cux.) infula</i> Theobald ¹
<i>Cx. (Cux.) murrelli</i> Lien ¹
<i>Cx. (Cux.) pseudovishnui</i> Colless
<i>Cx. (Cux.) quinquefasciatus</i> Say
<i>Cx. (Cux.) sitiens</i> Wiedemann
<i>Cx. (Cux.) tritaeniorhynchus</i> Giles
<i>Cx. (Cux.) vishnui</i> Theobald
<i>Cx. (Cux.) whitmorei</i> (Giles)
<i>Cx. (Culicomyia) nigropunctatus</i> Edwards ¹
<i>Cx. (Cui.) pallidothorax</i> Theobald
<i>Cx. (Eumelanomyia) brevialpis</i> (Giles)
<i>Cx. (Eum.) malayi</i> (Leicester) ¹
<i>Cx. (Lophoceraomyia) infantulus</i> Edwards
<i>Cx. (Lop.) minutissimus</i> (Theobald)
<i>Cx. (Lop.) rubithoracis</i> (Leicester) ¹
<i>Cx. (Lutzia) fuscus</i> Weidemann
<i>Cx. (Lut.) halifaxii</i> Theobald ¹
<i>Ficalbia minima</i> (Theobald) ¹
<i>Malaya genurostris</i> Leicester ¹
<i>Mansonia (Mansonioides) annulifera</i> (Theobald)
<i>Ma. (Man.) uniformis</i> (Theobald)
<i>Mimomyia (Etorleptomyia) luzonensis</i> (Ludlow) ¹
<i>Mi. (Mimomyia) chamberlaini</i> Ludlow
<i>Mi. (Mim.) hybrida</i> (Leicester) ¹
<i>Ochlerotatus (Mucidus) scatophagoides</i> (Theobald)
<i>Toxorhynchites (Toxorhynchites) splendens</i> Weidemann
<i>Uranotaenia (Uranotaenia) campestris</i> Leicester ¹
<i>Ur. (Ura.) edwardsi</i> Barraud ¹
<i>Ur. (Ura.) longirostris</i> Leicester ¹
<i>Verrallina (Neomaclaea) indica</i> (Theobald) ¹

¹ A species reported from Pondicherry for the first time.

spectively. Besides these 3 genera, collections of Nair (1960) included only *Armigeres* and *Mansonia*. *Anopheles aconitus* recorded by Nair (1960) was not obtained during subsequent collections. Also, *An. leucosphyrus*, *Ve. pseudomediofaciata*, and *Cx. pluvialis* recorded in the mosquito survey in 1977 (VCRC, unpublished data) have not been collected subsequently. Lack of voucher specimens of earlier collections does not permit confirmation of their occurrence. We have excluded these 4 species from the list of mosquitoes of Pondicherry, as they were not obtained in the extensive collections made during the present survey.

Of the 64 species recorded, 61 were collected as immatures from different habitats. The larval habitats of mosquitoes are varied and different classifications are available (Bates 1949, Colless 1957, Mattingly 1969), but Laird (1988) proposed a standard system comprising 11 categories in 2 broad subdivisions, namely, aboveground waters and subterranean waters. Though the larval habitats in Pondicherry can be grouped under 8 of these categories, the peculiar preference of certain species required further description (Table 2). As polluted drains, cesspits, and septic tanks are known to support breeding of *Cx. quinquefasciatus*, these have not been included.

Ground pools constituted 1 of the important larval habitats from which 34 species were collected. Presence or absence of vegetation in irrigation canals and ponds and the condition of water (clear versus muddy) in wells and cement tanks similarly resulted in higher numbers of species inhabiting these habitats.

Exploitation of a wide variety of larval habitats was evident in some species of *Culex* and *Anopheles*, while those of *Aedes* were habitat specific. *Anopheles barbirostris*, *An. subpictus*, *Cx. bitaeniorhynchus*, *Cx. fuscus*, *Cx. gelidus*, *Cx. minutissimus*, *Cx. pseudovishnui*, and *Cx. tritaeniorhynchus* inhabited 4–6 categories, while species of *Aedes* inhabited not more than 2. This marked habitat preference in *Aedes* extended to the subgeneric level, as species of subgenera *Stegomyia*, *Christophersomyia*, and *Diceromyia* were collected only from natural or artificial containers and those of subgenus *Aedimorphus* only from ground pools.

Notes on new records

Of the 64 species recorded, 25 species have been collected for the first time in Pondicherry. For each new record, locality of collection, the larval habitat and its nature, and associated species are provided. Distribution of these species in other states of India, known from literature, is also given.

Aedeomyia (Aedeomyia) catasticta Knab: Locality: Thirukanur and Karikalampakkam. Larvae were collected in riverbed pools, lakes, and ponds. They were found to inhabit areas with floating aggregates of decaying aquatic vegetation. Associated

Table 2. Mosquito species recorded in different larval habitats (indicated by an X) in Pondicherry, India.¹

Species	Types of larval habitat with superscript indicating the category															
	IC ²	RB ³	LK ⁴	PO ⁵	GP ⁶	SP ⁶	BP ⁶	PF ⁶	BT ⁶	TH ⁷	BS ⁷	LA ⁷	RP ⁷	CT ⁸	AC ⁸	WL ⁹
<i>Aedeomyia catasticta</i>	—	X	X	X	—	—	—	—	—	—	—	—	—	—	—	—
<i>Aedes aegypti</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	X	X	—
<i>Ae. albopictus</i>	—	—	—	—	—	—	—	—	X	X	X	X	X	X	X	—
<i>Ae. annulostris</i>	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
<i>Ae. jamei</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Ae. krombeini</i>	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
<i>Ae. lineatopennis</i>	—	—	—	X	X	—	—	—	—	—	—	—	—	—	—	—
<i>Ae. novalbopictus</i>	—	—	—	—	—	—	—	—	X	X	—	X	—	X	—	—
<i>Ae. pallidostris</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Ae. pipersalatus</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Ae. ramachandrai</i>	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
<i>Ae. reginae</i>	—	—	—	—	—	—	—	—	X	X	—	—	—	—	—	—
<i>Ae. thomsoni</i>	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
<i>Ae. vexans</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Ae. vittatus</i>	—	—	—	—	—	—	—	—	—	—	—	—	X	X	X	—
<i>Ae. w-albus</i>	—	—	—	—	—	—	—	—	X	X	—	—	—	—	—	—
<i>Anopheles annularis</i>	—	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>An. barbirostris</i>	X	X	—	—	X	—	—	—	X	—	—	—	—	—	—	X
<i>An. culicifacies</i>	—	X	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>An. jamei</i>	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>An. nigerrimus</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	X
<i>An. peditaeniatus</i>	—	—	—	—	X	—	—	X	—	—	—	—	—	X	—	X
<i>An. stephensi</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	X
<i>An. subpictus</i>	X	X	—	—	X	—	—	X	X	—	—	—	—	—	—	X
<i>An. vagus</i>	X	—	—	—	X	—	—	X	—	—	—	—	—	—	—	—
<i>An. varuna</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
<i>Armigeres subalbatus</i>	—	—	—	—	—	—	—	—	—	—	X	—	—	X	X	—
<i>Culex bitaeniorhynchus</i>	X	—	—	X	X	—	—	X	—	—	—	—	—	—	—	—
<i>Cx. brevipalpis</i>	—	—	—	—	—	—	—	—	X	X	X	—	—	—	—	—
<i>Cx. fuscus</i>	X	—	—	—	X	X	—	—	—	—	—	—	—	X	—	X
<i>Cx. fuscocephala</i>	—	—	—	—	X	—	—	—	X	—	—	—	—	—	—	—
<i>Cx. gelidus</i>	X	—	—	X	X	—	—	—	X	—	—	—	—	X	—	—
<i>Cx. halifaxii</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Cx. hutchinsoni</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
<i>Cx. infantulus</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	X
<i>Cx. infula</i>	—	—	—	X	X	—	—	—	—	—	—	—	—	—	—	—
<i>Cx. malayi</i>	X	—	—	—	X	—	—	—	—	—	—	—	—	—	—	X
<i>Cx. minutissimus</i>	X	—	—	—	X	X	—	—	—	—	—	—	—	X	—	X
<i>Cx. murrelli</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	X	—	X
<i>Cx. nigropunctatus</i>	—	—	—	—	X	—	X	—	—	—	—	—	—	—	—	—
<i>Cx. pallidothorax</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
<i>Cx. pseudovishnui</i>	X	—	X	—	X	—	—	X	—	—	—	—	—	—	—	—
<i>Cx. quinquefasciatus</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	X	—	—
<i>Cx. rubithoracis</i>	—	—	—	X	X	—	—	—	—	—	—	—	—	—	—	—
<i>Cx. sitiens</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—
<i>Cx. tritaeniorhynchus</i>	X	X	X	X	X	X	—	X	X	—	—	—	—	X	—	—
<i>Cx. vishnui</i>	—	—	—	X	—	—	—	—	X	—	—	—	—	X	—	—
<i>Cx. whitmorei</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	X	—	—
<i>Ficalbia minima</i>	X	—	—	X	—	—	—	—	—	—	—	—	—	—	—	—
<i>Mansonia annulifera</i>	X	—	—	X	X	—	—	—	—	—	—	—	—	—	—	—
<i>Ma. uniformis</i>	X	—	—	X	—	—	—	—	—	—	—	—	—	—	—	—
<i>Mimomyia chamberlaini</i>	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	—
<i>Mi. hybrida</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Mi. luzonensis</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Malaya genurostris</i>	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
<i>Ochlerotatus scatophagoides</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
<i>Toxorhynchites splendens</i>	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
<i>Uranotaenia campestris</i>	—	—	—	—	X	X	—	—	—	—	—	—	—	—	—	—
<i>Ur. edwardsi</i>	—	—	—	—	X	X	—	—	—	—	—	—	—	—	—	—
<i>Ur. longirostris</i>	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Verrallina indica</i>	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—

¹ IC, irrigation canal; RB, riverbed pool; LK, lake; PO, pond; GP, ground pool; SP, seepage pool; BP, burrow pit; PF, paddy field; BT, betel nut (*Piper betle*) plantation; TH, tree hole; BS, bamboo stump; LA, leaf axil; RP, rock pool; CT, cement tank; AC, artificial container; WL, well.

² flowing streams; ³ stream pools; ⁴ lake edges; ⁵ shallow permanent ponds; ⁶ shallow temporary pools; ⁷ natural containers; ⁸ artificial containers; ⁹ subterranean waters (artificial).

species: *Mi. chamberlaini*. Distribution: Assam, Karnataka, and Kerala.

Aedes (Aedimorphus) pallidostriatus (Theobald): Locality: Auroville. Larvae found along the margin of ground pools with grassy outgrowths. Associated species: *Ae. jamesi*, *Oc. scatophagoides*, *Ve. indica*. Distribution: Andhra Pradesh, Bihar, Gujarat, Karnataka, Punjab, TamilNadu, Tripura, Uttar Pradesh, and West Bengal.

Aedes (Aedimorphus) pipersalatus (Giles): Locality: Auroville. Larvae collected only in ground pools with fresh rainwater. Distribution: Andhra Pradesh, Assam, Bihar, Goa, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, and West Bengal.

Aedes (Christophersomyia) annulirostris (Theobald): Locality: Puthupattu. Larvae occurred only in tree holes. Distribution: Andhra Pradesh, Goa, Karnataka, Kerala, Maharashtra, and Tamil Nadu.

Aedes (Christophersomyia) thomsoni (Theobald): Locality: Auroville and Edayanchavadi. Larvae collected only in tree holes. Associated species: *Ae. albopictus*, *Ae. novalbopictus*. Distribution: Andhra Pradesh, Himachal Pradesh, Jammu and Kashmir, Karnataka, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, and West Bengal.

Aedes (Diceromyia) ramachandrai Reuben: Locality: Puthupattu. Larvae occurred only in tree holes in scrub forests. This is the first record of larva for this species. Associated species: *Ae. novalbopictus*, *Ae. albopictus*. Distribution: type locality, Musalimadagu forest in Andhra Pradesh.

Aedes (Diceromyia) reginae Edwards: Locality: Mettupalayam, Auroville, and Puthupattu. Collected from tree holes and bamboo stumps. Associated species: *Ae. albopictus*, *Ae. novalbopictus*, *Ae. w-albus*, *Cx. brevipalpis*, *Ar. subalbatus*. Distribution: Goa, Orissa, Tamil Nadu, and West Bengal.

Aedes (Stegomyia) krombeini Huang: Locality: Auroville and Puthupattu. Larvae occurred exclusively in tree holes. Associated species: *Ae. albopictus*, *Ae. novalbopictus*. Distribution: Andaman Islands, Goa, Orissa, and Tamil Nadu.

Aedes (Stegomyia) novalbopictus Barraud: Locality: Mettupalayam, Puthupattu, Auroville, and Othiampattu. Collected in tree holes, bamboo stump, rock pool, and artificial containers. Associated species: *Ae. albopictus*, *Ae. w-albus*, *Ae. krombeini*, *Ae. reginae*, *Ae. ramachandrai*, *Ae. thomsoni*, *Ae. vittatus*, *Cx. brevipalpis*, *Tx. splendens*. Distribution: Bihar, Kerala, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, and West Bengal.

Anopheles (Anopheles) peditaeniatus (Leicester): Locality: Kizhoor. Larvae occurred in fresh water ground pools with grassy margin and in paddy fields. Distribution: Arunachal Pradesh, Assam, Goa, Karnataka, Manipur, Meghalaya, Orissa, Tamil Nadu, Uttar Pradesh, and West Bengal.

Culex (Culex) hutchinsoni Barraud: Locality: Kakkayanthopu, Pathukannu, Thiruvandarkoil, Mettupalayam, and Dubrayapet. Collected from ce-

ment tank with decaying leaves in the water. Associated species: *Ae. albopictus*, *Cx. minutissimus*, coconut husk retting tank with *Cx. quinquefasciatus*, *Cx. fuscanus*, *Cx. whitmorei*, and *Ar. subalbatus*. Originally known only in Assam. Later reported from Karnataka. The present report extends its range to the southeastern coast of the country.

Culex (Culex) infula Theobald: Locality: Kuni-champattu. Larvae occurred in close association with algae in ponds and ground pools. Also found in cement tanks with vegetation. Associated species: *Cx. bitaeniorhynchus*. Distribution: Assam, Goa, Karnataka, Manipur, Orissa, Tamil Nadu, and Uttar Pradesh.

Culex (Culex) murrelli Lien: Locality: Auroville, Puthupattu. Larvae occurred in ground pools, cement tanks with vegetation and wells in disuse. Associated species: *An. subpictus*, *An. barbirostris*, *Cx. malayi*, *Cx. minutissimus*, *Cx. pallidothorax*, *Cx. tritaeniorhynchus*, *Cx. fuscanus*. Distribution: Assam.

Culex (Culicomyia) nigropunctatus Edwards: Locality: Puthupattu. Rain-filled ground pools and burrow pits formed the larval habitats of this species. Associated species: *Cx. fuscanus*, *Cx. tritaeniorhynchus*, *Cx. malayi*, *Cx. fuscocephala*, *Ve. indica* in ground pools. Distribution: Andhra Pradesh, Assam, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Orissa, and Tamil Nadu.

Culex (Eumelonomyia) malayi (Leicester): Locality: Puthupattu, Katterikuppam, and Kizhoor. Larvae collected from irrigation canals with vegetation, ground pools, and wells. Associated species: *An. barbirostris*, *An. subpictus*, *Cx. tritaeniorhynchus*, *Cx. fuscanus*, *Cx. nigropunctatus*, *Cx. murrelli*, *Cx. minutissimus*, *Mi. chamberlaini*. Distribution: Andaman Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, and Uttar Pradesh.

Culex (Lophoceraomyia) rubithoracis (Leicester): Locality: Bahour. Larvae collected in pond and ground-pool habitats with vegetation and grassy margin. Associated species: *Mi. luzonensis* and *Ur. edwardsi*, a ground pool contaminated with effluent from cattle-shed with *Cx. quinquefasciatus*. Distribution: Assam, Karnataka, Kerala, Manipur, and West Bengal.

Culex (Lutzia) halifaxii Theobald: Locality: Villianur. Larva obtained from ground pool. Distribution: Andaman Islands, Assam, Kerala, Madhya Pradesh, Manipur, and Orissa.

Ficalbia minima (Theobald): Locality: Pinachikuppam. Larvae occurred in irrigation canal and ponds infested with hydrophytes. Associated species: *Cx. tritaeniorhynchus*, *Ma. annulifera*. Distribution: Assam, Kerala, Orissa, and West Bengal.

Malaya genurostris Leicester: Locality: Villianur and Botanical garden in Boulevard. Larvae occurred only in leaf axils and spathe of *Arum* sp. and in leaf axils of *Ravenala madagascarensis* (travel-

ler's tree). Associated species: *Ae. albopictus*, *Cx. brevipalpis*. Distribution: Andaman Islands, Arunachal Pradesh, Assam, Bihar, Goa, Karnataka, Kerala, Mizoram, Orissa, Tripura, and West Bengal.

Mimomyia (Etorleptomyia) luzonensis (Ludlow): Locality: Bahour. Collected from ground pools with emergent vegetation. Associated species: *Cx. rubithoracis*, *Cx. gelidus*, *Ur. edwardsi*. Distribution: Assam, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Orissa, Sikkim, Tamil Nadu, Uttar Pradesh, and West Bengal.

Mimomyia (Mimomyia) hybrida (Leicester): Locality: Thirubuvanai. Found to inhabit only ground pools infested with hydrophytes. Associated species: *Ma. annulifera*. Distribution: Assam, Bihar, Karnataka, Kerala, Manipur, and West Bengal.

Uranotaenia (Uranotaenia) campestris Leicester: Locality: Puthupattu. Larvae occurred in ground pools and seepage pools formed from irrigation canals. Associated species: *Cx. tritaeniorhynchus*. Distribution: Andhra Pradesh, Assam, Bihar, Delhi, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, and Tamil Nadu.

Uranotaenia (Uranotaenia) edwardsi Barraud: Locality: Bahour and Mullodai. This is the first record of larva for this species. Found to inhabit ground pools with vegetation and seepage pools adjacent to irrigation canals. Associated species: *Cx. gelidus*, *Cx. rubithoracis*, *Mi. luzonensis*. Distribution: Assam and Manipur.

Uranotaenia (Uranotaenia) longirostris Leicester: Locality: Katterikuppam. Larvae occurred in irrigation canal with vegetation. Associated species: *An. vagus*, *An. barbirostris*, *Cx. fuscus*, *Cx. gelidus*, *Cx. tritaeniorhynchus*, *Cx. pseudovishnui*. Distribution: Assam, Kerala, and Orissa.

Verrallina (Neomacleaya) indica (Theobald): Locality: Pinachikuppam, Thirupanampakkam, Abishekapakkam, Auroville, and Puthupattu. Larvae were found in freshly filled ground pools after rains when water was clear. Associated species: *Ae. jamesi*, *Ae. pallidostriatus*, *Ae. lineatopennis*, *Cx. fuscus*, *Cx. tritaeniorhynchus*, *Cx. fuscocephala*, *Cx. nigropunctatus*, and *Oc. scatophagoides*. Distribution: Bihar, Delhi, Gujarat, Punjab, and Tamil Nadu.

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