Isolation of fourth-instars larva of *Aedes (Finlaya) harveyi* (Diptera: Culicidae) from the Nilgiri hills, Southern India

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Abstract During the post monsoon season of 2012, the ovitraps were employed for dengue vector surveillance nearer to human habitations in the Nilgiri hills of Southern India. All the eggs obtained were brought to laboratory, and reared individually to adult stage for identification. A total of 30 exuviae of fourth-instars larva specimen were identified as *Aedes (Finlaya) harveyi* which were compared to other closely related species. Though the adult male and female of *Aedes (Finlaya) harveyi* were recorded from some parts of India but so far the larval stage has not been recorded.

Keywords *Aedes (Finlaya) harveyi* · Fourth-instars larva · Nilgiri Hills

Originally the adult male and female of *Aedes (Finlaya) harveyi* Barraud 1923 was briefly described by Barraud (1934) from Kurseong, Darjeeling district, North-eastern India. According to Barraud (1934), Senior White 1923 and JD Bailly 1927 also recorded the adults of *Ae. (Fin) harveyi* from Coonoor, Nilgiri district and Mercara, Coorg district,

Southern India respectively. But so far, the larva of *Ae. (Fin) harveyi* has not been isolated and reported from India. During the post monsoon season of 2012, dengue vector surveillance was carried out using ovitrap as a surveillance tool. The eggs of *Ae. (Fin) harveyi* were obtained through ovitraps in and around human habitations of Coonoor town, Nilgiri hills. The fourth-instars larva of *Ae. (Fin) harveyi* is described for the first time in India. The larva of *Ae. (Fin) harveyi* is similar to *Ae. (Fin) chryso-laeniatatus* Theobald 1903, *Ae. (Fin) formosensis* Yamada 1921, *Ae. (Fin) pallirostris* Edwards 1922 and *Ae. (Fin) pseudotaeniatatus* Giles 1901, but chiefly differs from them with only little variations in cheototaxy. The distinguishing characters of these species are discussed. The species were identified following the key of Barraud (1934). The abbreviations of generic and sub-generic names are from Reinert (1975).

Sample collection

During the post monsoon season of 2012, the ovitraps were employed for dengue vector surveillance nearer to human habitations in a locality, Providence college campus, Coonoor, Nilgiri, Southern India. All the eggs obtained were brought to laboratory, reared individually to adult stage and identified the species following the key of Barraud (1934). A total of 20 female and 10 male adults were obtained from egg stage. The eggs hatched 10–12 days after oviposition and adult emerged 15–20 days after hatching. Subsequently the immature of *Ae. (Fin) harveyi* were also collected from discarded tin, plastic containers and rock pools around Coonoor town namely Ambedhkar Nagar, Tiger hill cemetery yard and Singara estate.

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Description

Larva

The description is based on 30 fourth instars larval exuviae (Fig. 1). Head: Antenna about 0.5 length of head, with short scanty spicules; seta 1-A weakly aciculate, usually bifid (1, 2) inserted at about 0.7 length of antenna; 2-6-A single, attached at apex; 1-C single, long, tapering; 3-C single, small; 4-C with 5, 6 branches; 5-C with 4, 5 branches; 6-C with 6–8 branches; 7-C weakly aciculate with 6, 7

Fig. 1 Fourth-instar larva of *Aedes (Finlaya) harveyi* (Diptera: Culicidae)

branches; 8-C double; 9-C single; 10-C single or double; 11-C weakly aciculate with 4, 5 branches; 12-C double; 13-C always single; 14-C single or double; 15-C with 2, 3 branches; dorsomentum with 8–12 teeth on either side of broad median tooth. Thorax and abdomen: moderately pigmented, extensive twisting of exuviae made it difficult to interpret thoracic and abdominal setae accurately; segment VIII with comb of 28–45 scales arranged in triangular patch, each scales finely fringed from near base to apex; 1-X single, weakly aciculate, about 1.5 length of saddle; 2-X long, single; 3-X usually double; 4-X with 10–12 aciculate setae; saddle incomplete, moderately pigmented, spiculate, stronger spicules on caudal margins; acus absent.

Siphon: moderately pigmented, spiculate, index 1.60–1.85; acus present; pecten composed of 16–18 evenly spaced spines, basal spine shorter, each spine with 1–3 lateral denticles, usually with 1, 2 stronger denticles, most apical spine usually attached before insertion of 1-S; seta 1-S with 4–5 aciculate branches, attached on basal 0.65 of siphon; seta 2, 6–9-S single.

Comprehensive information of the specimen

Diagnosis

In the larva, segment VIII with 28–45 comb scales arranged in triangular patch, each scale with fine spicules evenly spaced from near base to apex. Siphon moderately pigmented, speculate, pecten composed of 16–18 evenly spaced spines, basal spine shorter, each spine with 2–4 lateral denticles, most apical spine usually simple, attached before the insertion of 1S; Seta 1-S with 4, 5 aciculate branches, attached at about 2/3 length of siphon.

Taxonomic discussion

The larval chetotaxy of *Aedes (Finlaya) harveyi*, is very similar to species of *Finlaya* group which includes *Ae.*

Table 1 Differential characters for 5 species of the *Finlaya* group

Character	<i>Ae. harveyi</i> ^a	<i>Ae. chrysolaeniatus</i> ^b	<i>Ae. formosemsis</i> ^b	<i>Ae. pallirostris</i> ^c	<i>Ae. pseudotaeniatus</i> ^b
Comb	28–45 fringed scales	26–30 fringed scales	25–40 fringed scales	25–40 scales each with 2–5 large prominent apical spines	40–45 fringed scales
Pecten	16–18 spines, last tooth simple, usually attached before 1-S	16–19 spines each with 2, 3 denticles	10 spines with narrow basal denticles, 1 simple tooth before 1-S	15–22 spines, each with 1–4 denticles, attached usually before 1-S	21–28 spines each with lateral denticles
1-S	4, 5 branches/attached at 2/3 length of siphon	5, 6 long branches attached at 3/5 length of siphon	3 branched attached at 2/3 length of siphon	3–4 branches attached at basal 0.65 length of siphon	4–6 branches attached at 2/3 length of siphon

^a New record

^b Recorded by Barraud (1934)

^c Tewari and Hiriyan (1996)

(*Fin*) *chrysolaeniatus*, *Ae. (Fin) formosensis*, *Ae. (Fin) pallirostris* and *Ae. (Fin) pseudotaeniatus* with some overlapping characters. *Aedes (Fin) chrysolaeniatus* and *Ae. (Fin) Pseudotaeniatus* which are closely similar in larval cheototaxy to *Ae. (Fin) harveyi* occurring in Nilgiri hills. The occurrence of *Ae. (Fin) formosensis* in Assam, India reported by Barraud (1934) is referred to *Ae. (Fin) pallirostris* (Tewari and Hiriyani 1996). Differential characters for these 5 species based on larval cheototaxy are discussed. *Ae. (Fin) harveyi*, is having more similarity with *Ae. (Fin) Chrysolaeniatus* in number and the shape of comb scales, pecten spines and the insertion of 1-S; *Ae. (Fin) harveyi* differs from *Ae. (Fin) formosensis* by possessing 16–18 pecten spines as against 10 pecten spines in *Ae. (Fin) formosensis*. It differs from *Ae. (Fin) pallirostris* in the shape of evenly fringed comb scales; it also differs from *Ae. (Fin) pseudotaeniatus* by having 16–18 pecten spines as against *Ae. (Fin) pseudotaeniatus* having 21–28 pecten spines. The detailed differentiating points are described in Table 1.

Bionomics

Though the medical importance of *Ae. (Finlaya) harveyi* is not known, its larvae were newly recorded from Coonoor,

Southern India near human habitations from tin, plastic containers and rock pools in association with *Ae. albopictus* (Skuse), 1895.

All the corresponding specimens (10 males, 20 females and 30 larval exuviae) are retained in the museum of National Centre for Disease Control (NCDC), Coonoor branch, India.

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