Description of the Fourth Instar Larva of *Culex (Culex) trifilatus trifilatus* Edwards, 1914 (Diptera, Culicidae)

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ABSTRACT. The hitherto unknown fourth instar larva of *Culex trifilatus trivilatus* Edwards 1914, is described and the diagnostic characters for the separation of the nominate subspecies from *Culex trifilatus aenescens* Edwards 1941 are given.

INTRODUCTION

Culex trifilatus was described by Edwards (1914) on the basis of adult specimens of both sexes from Kabete, Kenya. Much later, the same author described subspecies *aenescens* from the Toro District, in Uganda, also based on adults (Edwards 1941). The fourth instar larva of this subspecies was described by Hopkins (1952). However, as far as we know, the larva of the nominate subspecies remaines unknown (Knight and Stone 1977; Knight 1978).

During the survey of the Angolan mosquitoes being carried out by the first and third authors, several dozen larvae differing only slightly from those of subspecies *aenescens* were caught at Huambo (=Nova Lisboa), and a few typical *trifilatus* imagines of both sexes were reared (Ribeiro and Ramos 1980). A series of 20 fourth instar larvae and a larval skin, collected by Dr. T. S. Detinova in Amani, Tanzania, 26 October 1962, initially suspected by the second author (Danilov) to belong also to *trifilatus sensu stricto*, showed to be, in fact, indistinguishable from the Angolan larvae.

The brief description that follows is based on the examination of all this material and adopts the system developed by Belkin (1962) for the larval chaetotaxy.

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DESCRIPTION

Length, color and general morphology as in subspecies *aenescens*.

Head (Fig. 1 A, B and Table 1). Broader than long. Setae 1-C rather thin and finely drawn out distally, their lengths somewhat shorter than distances between their bases. Antenna 0.61 ± 0.028 head length (range 0.58 - 0.67; n = 36), slender, narrowed distad of seta 1-A, spiculate and darkened at extreme base and distal third. Antennal tuft (seta 1-A) inserted at about 3/4 of shaft from the base (0.73 ± 0.018; 0.69 - 0.78; n = 75), with 24.93 ± 1.14 (range 23-27; n = 30). Setae 2-, 3-A inserted near tip of antennal shaft. Mental plate (Fig. 1B) with strong central apical tooth and 8-11 lateral teeth on either side. One tooth at base greatly enlarged and 1 or 2 subbasal teeth more strongly developed on each side. Total number of teeth in mental plate 19.92 ± 1.11 (range 17-22; n = 54). Clypeus separated from rest of head by transverse chitinous bar.

Abdomen (Fig. 1 C-G and Table 1). Comb of segment VIII (Fig. 1 C, D) usually with 34-57 (mean 47.41 ± 4.69; n = 89) narrow scales, but in five larvae of the Tanzanian series this number was much smaller, from 12 to 23 (mean 17 ± 3.65; n = 10). These larvae were collected in the same place and at the same time as 15 other larvae with a normal number of comb scales, being, except for this, quite identical with them*.

Index of siphon (Fig. 1 C) 3.15 ± 0.09 (range 2.61-3.88; n = 66). Pecten (Fig. 1 C) extending to about 0.60 of siphon length (range 0.52-0.75; n = 87), with 13.73 ± 1.89 rather evenly spaced spines (range 10-20; n = 134) which increase in size from base distally. The 3 or 4 distal pecten spines exceptionally long, straight and simple (Fig. 1 E), basal spines usually with 2 or 3 (range 1-4) small denticles (Fig. 1 F, G). Siphon with 6.07 ± 0.58 tufts (setae 1-S) usually inserted along the mid-ventral line (range 5-8; n = 67), each tuft consisting of 4.96 ± 0.86 plumose branches (range 3-9; n = 274) which are slightly longer than diameter of siphon at the insertion level. Whole set of ventral tufts occupying about the central third of siphon, a little nearer to the base, usually within the pecten. On each side of the distal 2/5 of siphon there are usually 2 (only one in about 10 percent of the instances) lateral tufts (setae 1 a-S) with 1-5 (usually 2 or 3) simple branches which are about as long as siphon breath. Seta 9-S rather strong, curved.

Anal segment (Fig. 1 C) about as long as wide or a little longer, completely ringed by the saddle. Lateral seta (1-X) always single, usually 3/4 length of saddle: 0.75 + 0.01 (range 0.57-1.09; n = 70). Seta 2-X with the longest branch slightly shorter than seta 3-X, the other (one or two) branches only about half the long one or less. Ventral brush (4-X) consisting of 12.00 ± 0.32

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*Similar bimodal distribution of the number of comb scales was observed, for example, in the 4th stage larva of *Aedes (Ochlerotatus) fitchii* Felt and Young from Minnesota, U. S. A. (Barr 1958).

well developed tufts (range 11-13; n = 61). Anal papillae broad, dorsal pair about 3.12 ± 1.98 times length of ventral (range 1.84-4.60; n = 41) and 1.36 ± 0.27 times length of saddle (range 0.92-1.79; n = 34). Ventral pair only about half of saddle: 0.49 ± 0.16 (range 0.31-0.97; n = 63).

TAXONOMY AND DIAGNOSIS

The larvae of both forms of *Culex trifilatus* sensu lato are very similar. Nevertheless, larval *trifilatus* sensu stricto exhibits some minor differences from *aenescens* larvae, as follows: seta 5-C usually with 4 or more branches, instead of 3; siphon tufts (1-S) inserted along the mid-ventral line or very close to it, with 3-9 (mean 5) branches, instead of the alternating tufts of *aenescens*, each with 2-5 branches; ventral pair of anal papillae only about half of saddle, instead of being about the same length, and dorsal pair about three times the length of ventral, instead of 1 1/2 times.

Though these differences will probably separate the great majority of the larvae of both forms, they are, in fact, less marked than those usually found between different species, which confirms the subspecific status given by Edwards (op. cit.) to the adult-based *aenescens*.

According to our present knowledge of their geographical distribution, the two forms are allopatric, which is also consistent with a taxonomic treatment at the subspecific level. Subspecies *trifilatus* is distributed throughout the highlands of the East and South African Subregion, while subspecies *aenescens* appears to be confined to the West African Subregion, according to the division of the Ethiopian Region by Chapin (1932).

In order to include both subspecies of *Cx. trifilatus*, the larval key to genus *Culex* by Hopkins (op. cit.) may be amended as follows:

12. Pecten extending to 3/5 or beyond 13

\- Pecten not extending beyond 1/2, seldom beyond 1/3 14

13. Siphonal index about 6 or more . . . . . *weschei*

\- Index about 3 1/2 . . . . . 13a

13a. Head seta C (seta 5-C) usually with 4 or more branches, rarely trifid; siphon tufts (setae 1-S) inserted along the mid-ventral line or very close to it, each with 3-9 branches; gills (anal papillae) broad, ventral pair only about 1/2 of saddle and 1/3 of dorsal pair . . . . . *trifilatus trifilatus*

\- Head seta C 3-branched; subventral tufts of siphon alternate in position, not in line, each with 2-5 branches; gills slender, ventral pair about as long as saddle and 2/3 of dorsal pair . . . . . *trifilatus aenescens*

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LEGEND

Fig. 1. *Culex (Culex) trifilatus trifilatus*. Fourth instar larva.

A. Head

B. Mental plate

C. Abdominal segments VIII, X and siphon

D. Comb scales

E. Distal pecten tooth

F. Median pecten tooth

G. Proximal pecten tooth

Table 1. Chaetotaxy of the fourth instar larva of *Culex (Culex) trifilatus trifilatus* Edwards[a]

		Seta nr.	n	Observed range	Mean	95% confidence interval	Standard deviation [b]	Coefficient of variability
Head	Antenna (A)	1	30	23-27	24-93	24.50-25.36	1.14	4.57
	Capsule (C)	4	120	1	1	———	0	0
		5	83	3-7	4.76	4.61-4.91	0.69	14.50
		6	103	3-5	4.19	4.08-4.30	0.58	13.84
		7	85	5-12	9.11	8.80-9.42	1.44	15.81
		8	83	1-3	1.99	1.94-2.04	0.24	12.06
		9	67	2-4	2.82	2.68-2.96	0.56	19.86
Prothorax (P)		1	79	1	1	———	0	0
		2	66	1	1	———	0	0
		3	99	1	1	———	0	0
		4	100	1-5	2.70	2.57-2.83	0.66	24.44
		5	60	1	1	———	0	0
		6	79	1	1	———	0	0
		7	70	2-3	2.15	2.05-2.25	0.40	18.61
		8	89	2	2	———	0	0
Abdomen	Seg. VIII	1	96	3-7	4.77	4.62-4.92	0.76	15.93
		2	105	1	1	———	0	0
		3	87	5-10	7.51	7.30-7.72	0.96	12.78
		4	100	1	1	———	0	0
		5	80	3-6	4.23	4.09-4.37	0.62	14.66
	Siphon (S)	1	274	3-9	4.96	4.86-5.06	0.86	17.34
	Anal seg. (X)	1	90	1	1	———	0	0
		2	108	2-3	2.04	2.00-2.07	0.19	9.33
		3	100	1	1	———	0	0

[a]See also text; [b]The standard deviations are those of the Angolan series

Fig. 1