DESCRIPTION OF THE LARVA AND PUPA OF AEDES (VERRALLINA) AGRESTIS (DIPTERA: CULICIDAE)

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ABSTRACT. The fourth-instar larva and pupa of *Aedes (Verrallina) agrestis* Barraud are described and illustrated for the first time.

INTRODUCTION

The female of Aedes (Verrallina) agrestis Barraud, 1931 was originally described from southern India. It was briefly redescribed by Barraud (1934). Subsequently, Reinert (1974) and Tewari and Hiriyan (1988) added descriptions of the female genitalia and the male, respectively. We have reared the immatures of Ae. agrestis in the laboratory by obtaining eggs from wild-caught females captured in Western Ghats, India. Descriptions of the

fourth-instar larva and pupa are presented here with illustrations.

MATERIALS AND METHODS

Five fully fed wild-caught females were kept in the laboratory for oviposition. They laid 152 eggs, which were individually reared. Considerable mortality occurred during rearing and only five adult progeny were obtained. Identification of species was con-

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Table 1. Chaetotaxy of the fourth-instar larva of Aedes (Verrallina) agrestis.

Seta _	Hea	ıd		Thorax		Abdominal se	gments
no.	Α	C	P	M	T	I	II
0		1	6–12	_	_	_	1
1	3-6(5)	1	1-3(2)	2-6(3)	3–6	1	1
2	1	_	2,3(2)	2-4(3)	3–6	1	1
3	1	1	2-4(3)	1,2(1)	5–16	4–7(5)	3-7(5)
4	1	3–6	2-5(4)	5-10(6)	4-8(5)	12–16(14)	9–16
5	1	2-4(3)	1	1	1	3–9(7)	4-6(5)
6	1	1,2(1)	1	4-9(7)	2-5(4)	2,3(2)	1,2(2)
7	_	5-9(7)	2	1,2(1)	7-10(7)	1,2(1)	5-9(7)
8	_	3,4(4)	1	6-9(7)	12–17(13)		2,3(3)
9		3-5(4)	2	7-9(9)	2-5(3)	3-5(4)	1,2(1)
10	_	4-6(5)	1	1	1	4-6(5)	2,3(2)
11	_	4,5(4)	2-4(3)	1	1,2	4,5(4)	3-5(4)
12	_	4-8(8)	1	1	1	<u>-</u> `´	2-4(4)
13	_	3-5(5)	2-4(2)	6-13	9-13(10)	1,2(1)	9–14
14	_	1	_	6,7			_
15		5-8(6)	_			_	_

¹ Based on 17 specimens.

firmed by examining the male genitalia. Nomenclature and chaetotaxy follow Harbach and Knight (1980, 1982).

TAXONOMIC TREATMENT

Aedes (Verrallina) agrestis Barraud

Larva (Fig. 1). Chaetotaxy and measurements based on 17 specimens. Character and positions of setae as figured, range and modal number of branches in Table 1. Head: Moderately pigmented; setae 0,1,3,14-C single; 4-C with 3-6 fine branches; 5-C barbed with 2-4(3) branches; 6-C barbed, single or double (single); 7-C barbed with 5–9(7) branches; 8-C with 3,4(4) branches; 9-C with 3-5(4) branches; 10-C with 4-6(5) branches; 11-C with 4,5(4) branches; 12-C with 4-8(8) branches; 13-C with 3-5(5) branches; 15-C with 5-8(6) branches; 6-Mx single; dorsomentum with 34-40 teeth. Antenna: Moderately long, 0.38-0.44 (mean 0.41) length of head, spiculate, particularly basally; seta 1-A with 3-6(5) branches, inserted about 0.5 length of shaft; 2-A long, with subapical constriction; 3-A 0.2 length of 2-A; 4-A 0.36 length of 2-A; 6-A 0.26 length of 2-A. Thorax: Setal positions and branching as shown in Fig. 1 and Table 1. Abdomen: Seta 1-VIII barbed with 2-6(5) branches; 3-VIII barbed with 6-10(8) branches; 5-VIII barbed with 7-11(8) branches; comb scales of segment VIII in row of 10-12(10), each with strong, median, apical spine and fringe of spicules basolaterally; 2-X with 7-11 subequal branches; 4-X with 5 pairs of setae on grid and 2 shorter precratal setae, all with multiple branches; saddle moderately pigmented, incomplete; acus absent; anal papillae 4, long. Siphon: Short, moderately pigmented; acus well developed; index 1.44-1.92 (mean 1.64); pecten on basal 0.54-0.60 (mean 0.57) of siphon, composed of 10-14(11) spines, each spine with 1-3 basal denticles, apical 2 spines longer, widely spaced, usually without denticles; 1-S short, with 2-5(3) branches, inserted on basal 0.62-0.71 (mean 0.66) of siphon, distad of last pecten spine.

Pupa (Fig. 2). Chaetotaxy as figured and recorded in Table 2. Description based on 5 exuviae. *Trumpet*: Moderately to heavily pigmented, spiculate, index 2.82–3.10 (mean 2.93). *Abdomen*: Setae 6,9-VII weakly developed; 4-VIII with 2–4(3) branches; 9-VIII long, stout, single. *Paddle*: Ovoid; minute

Table 1. Continued.

		Abdo	minal segme	ents			Siphon
III	IV	V	VI	VII	VIII	X	S
1	1	1	1	1	1		_
4–8	4-8(7)	4-10	5-8(7)	5-9(7)	2-6(5)	1	2-5(3)
1	1	1	1	1	2,3(2)	7-11	1
5-10(6)	5-10(6)	3-8(4)	4–7(5)	6-9(7)	6-10(8)	1	_
3-5(4)	2-4(3)	4–13	6-9(7)	2-5(4)	2	5	_
3-5(3)	2-4(3)	2-4(3)	3-5(4)	5–9	7-11(8)	_	_
1 ` ´	1	1	1	12-16(12)	_	_	1
8-14(9)	7–13	8-14	3-6(4)	2-5(3)	_	_	1
1	1	1-3(1)	4–8	6–15	_		4-6(5)
1	1	1	1	2-5(3)	_	_	1
3,4(3)	2-5(3)	1,2(2)	2,3(2)	3-6(4)	_	_	_
2-4(3)	2,3(3)	2,3(3)	3,4(3)	2-4(2)	_	_	_
3-5(4)	2–4	1-3(2)	2-4(3)	3-6(4)	_	_	_
7-12	7–11	8-14	35-45	10-13			_
1	1	1	1	1	1	_	_
_	_	_	_	_	_	_	_

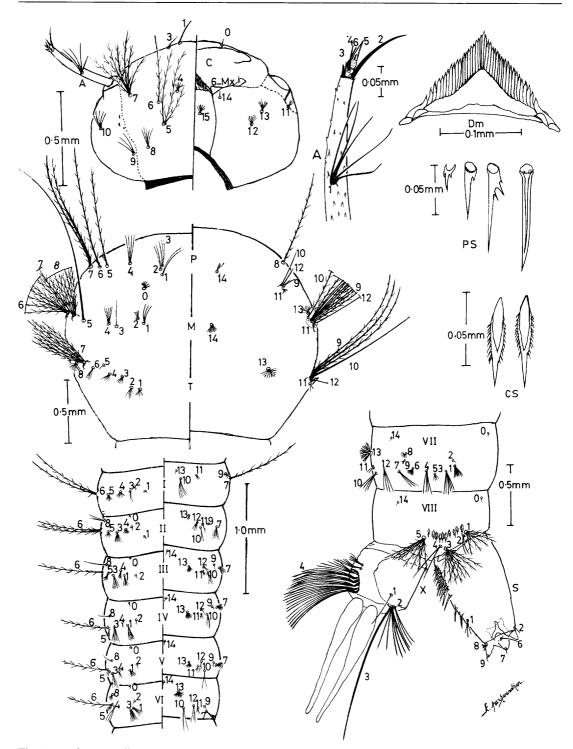


Fig. 1. Aedes (Verrallina) agrestis, fourth-instar larva. A = antenna, C = cranium, CS = comb scale, Dm = dorsomentum, M = mesothorax, P = prothorax, PS = pecten spine, S = siphon, S = siphon,

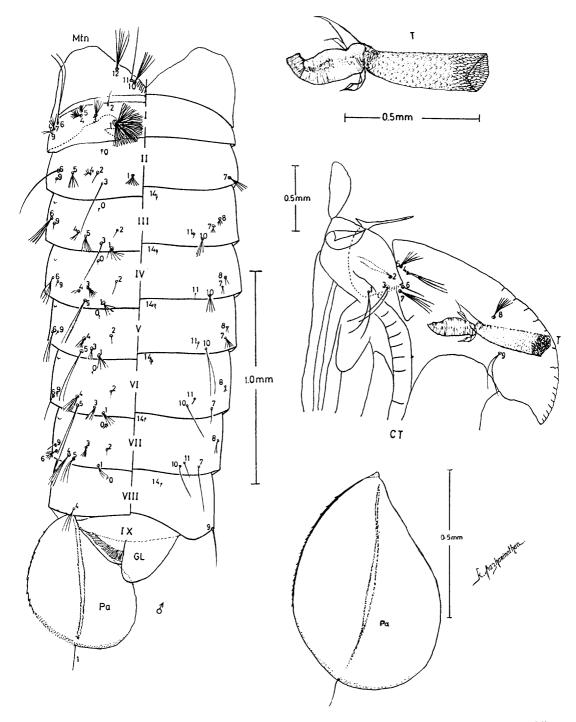


Fig. 2. Aedes (Verrallina) agrestis, pupa. CT = cephalothorax, GL = genital lobe, Mtn = metanotum, Pa = paddle, T = trumpet, I-IX = abdominal segments.

 Table 2.
 Chaetotaxy of the pupa of Aedes (Verrallina) agrestis.

Abdominal segments II III IV V VI VIII VIII 1	alo-										
III IV V VI VIII 1 1 1 1 1 1 1 1 1						Abdominal se	gments				Paddle
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	CT	ш	l	II	III	IV	Λ	VI	VII	VIII	Ь
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		ı		1	1	1	1	_	_	_	1
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		16-20		6–10	5–7(6)	4-6(4)	3–5(4)	4-6(4)	3-5(3)	۱ ۱	1 2(1)
1 4-7(6) 2-4(3) 2,3(3) 4-6(5) 3,4(3) 2-4(2) 6-8(6) 5-7 3,4(4) 4-7(7) 2,3(2) 2,3(2) 1-3(2) 2-4(3) 3,4 2-4 2-4(3) 1,2(1) 5-9 2,3 2-4(2) 5-8(6) 1,2(1) 1 3-5(4) 2-4(2) 2-4(2) 2-4(3) 2-4(2) 1 1 1 1 1 1 1.3(1) 3-5(4) 4-6(4) 1,2(2) 1 1 1.3(1) 1 1 1 1 1 1.2(1) 1		1		_	` 	1	-	1	1 (2)	ı	(1)=(1
3,4(3) $2-4(2)$ $6-8(6)$ $5-7$ $3,4(4)$ $4-7(7)$ $2,3(2)$ $2,3(2)$ $1-3(2)$ $2-4(3)$ $3,4$ $2-4$ $2-4(3)$ $1,2(1)$ $5-9$ $2,3$ $2-4(2)$ $5-8(6)$ $1,2(1)$ 1 $3-5(4)$ $2-4(2)$ $2-4(2)$ $2-4(2)$ $2-4(3)$ $2-4(2)$ 1 1 1 1 1 1 1 1 1 1		5-8(6)		1	-	4-7(6)	2-4(3)	2,3(3)	4-6(5)	I	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		8-10(9)		5-7(7)	3,4(3)	24(2)	(9)8-9	5-7	3.4(4)	2-4(3)	1
3,4 2–4 2–4(3) 1,2(1) 5–9 (2,3 2–4(2) 5–8(6) 1,2(1) 1 3–5(4) 2–4(2) 2–4(2) 2–4(3) 2–4(3) 2–4(2) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		3–5(4)		5-9(5)	4-7(7)	2,3(2)	2,3(2)	1–3(2)	24(3)		ı
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		1,2(2)		_	3,4	24	24(3)	1.2(1)	5-9`	ı	ı
3-5(4) $2-4(2)$ $2-4(2)$ $2-4(3)$ $2-4(2)$ 1 1 1 1 $1-3(1)$ $3-5(4)$ $4-6(4)$ $1,2(2)$ 1 1 1 1 1 $1 1 1 1 1 1 1 1 1$		3–5(4)		2–4(4)	2,3	2–4(2)	5–8(6)	1,2(1)	1	ı	I
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		ı		I	3–5(4)	4–6(4)	1.2(2)	_	, T	ı	ı
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		1		ı	1	ı	I	ı		ı	I
1 1 1		ı		ı	1	ı	1	ļ	1	I	ı
		1		ı	1	-	-	1	-	1	I

Based on five specimens.

serrations on basal 0.69–0.71 of outer margin and scanty minute spicules on apical 0.24–0.31 of outer margin and apical 0.18–0.25 of inner margin; midrib not reaching apex; seta 1-P 0.15 length of paddle; index 1.31–1.41 (mean 1.36).

Specimen data. Specimens reared from eggs laid by wild-caught females from daytime resting collection made at Noolpuzha, Sultan Battery, Wynad District, Kerala, southern India; 1 male (A 1343) with associated larval (1 670) and pupal (p 643) exuviae and 1 4thinstar larva (L 364) deposited in the U.S. National Museum of Natural History, Smithsonian Institution; 1 female (A 1344) with associated larval (1 671) and pupal (p 644) exuviae and 1 4th-instar larva (L 367) deposited in National Institute of Virology, Pune, India; 2 males, 1 female, 4 larval and 3 pupal exuviae, and 9 4th-instar larvae retained in the museum of Centre for Research in Medical Entomology, Madurai, India.

Distribution and biology. Larval habitats could not be found even though searches were made in the same area that the male described by Tewari and Hiriyan (1988) was found. Many adults were found resting at ground level in a humid habitat under bamboo bushes during the daytime. A few females fed on the collectors. In the laboratory only fully fed females survived even though adults were provided raisins and glucose. Rearing of immatures was difficult, and high mortality was recorded in early instars. Eggs hatched 4 or 5 days after oviposition and adults emerged 5 or 6 days after hatching.

Taxonomic discussion. In his review of subgenus *Verrallina*, Reinert (1974) placed *Ae. agrestis* in Section A, Series III, after examining only females. Subsequently, Tewari and Hiriyan (1988) described the male and confirmed this placement. The chaetotaxy of the immatures further strengthens Reinert's (1974) view that *Ae. agrestis* belongs to Section A, Series III, as the larva possesses seta 1-A with 3-6 branches, seta 7-C with 5-9 branches, comb scales with stout median apical spine and small spicules basolaterally and seta 2-X with 7-11 subequal branches. Reinert reported that seta 4-P is 3-6 and 1-3

branched in sections A and B, respectively. In the case of Ae. agrestis, this character overlaps as 4-P is 2-5(4) branched. The larval chaetotaxy is very similar to species of the Uncus Group, which includes Ae. crytolabis Edwards, Ae. latipennis Delfinado, Ae. leicesteri Edwards, Ae. torosus Delfinado, and Ae. uncus (Theobald). In the pupa the trumpet is expanded apically and seta 9-VIII is single. Seta 2-IV-VI is cephalad of seta 4 of the corresponding segment, which is similar to Ae. crytolabis, Ae. latipennis, Ae. leicesteri, and Ae. torosus.

There are some minor differences in setal branching between the immatures of Ae. agrestis and other species of the Uncus Group, but these are not sufficient to be used as diagnostic characters.

ACKNOWLEDGMENTS

We are grateful to R. Reuben, Director, Centre for Research in Medical Entomology, Madurai, for her encouragement and guidance. Thanks are due to Shriyuts K. Ayanar and A. Munirathinam for their excellent assistance in the laboratory and field, and K. Pazhaninathan for preparing the illustrations.

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