

## The pupae of Spanish Culicinae II: *Aedes vittatus* Bigot, 1861 (Diptera: Culicidae)

R. Melero-Alcibar

Servicio de Parasitología, Centro Nacional de Microbiología, Instituto de Salud Carlos III,  
Carretera Majadahonda-Pozuelo s/n. 28220 Majadahonda, Madrid, Spain  
Email: rmalcibar@isciii.es

### Abstract

The pupa of *Aedes vittatus* Bigot, 1861 is redescribed and illustrated. A table lists the range and mode of the branches of each pupal seta.

### Introduction

*Aedes vittatus* was described by Bigot (1861), based on females from Corsica.

The taxonomic status of *Ae. vittatus* has been discussed several times. Firstly, it was included in the genus *Stegomyia* due to morphological similarities with *Aedes aegypti* (Service, 1970), and then it was included in subgenus *Aedimorphus* (Huang, 1977; Schaffner, 1998; Romi *et al.*, 1997; Eritja *et al.*, 2000). Recently, the species was transferred to the new subgenus *Fredwardsius*, based on a distinct combination of characters that distinguish it from other subgeneric taxa (Reinert, 2000). Generic status was proposed for *Fredwardsius* in a recent phylogenetic study (Reinert *et al.*, 2004), but for the time being we prefer to retain it as a subgenus of *Aedes*.

This species occurs in the Afrotropical zoogeographical region and southern part of the Palaearctic region. In Europe, it is restricted to the occidental Mediterranean region: France, Italy, Spain and Portugal (Schaffner, 1998; Romi *et al.*, 1997; Eritja *et al.*, 2000; Ribeiro & Ramos, 1999).

Pupal characters of *Ae. vittatus* were given by Clavero (1946) in a short identification key, and Service (1970) briefly described and illustrated the pupa in a paper on the biology and taxonomy of this species in Northern Nigeria.

In the present paper the pupa of European *Ae. vittatus* is described and illustrated (Figures 1-3). The range and modal number of branches of each pupal seta are given in Table 1. Chaetotaxy and morphological terminology follow Harbach & Knight (1980).

*Aedes (Fredwardsius) vittatus* (Bigot, 1861)

*Cephalothorax* (figure 1): **Setae 1,2, 3,5,7,8,9-CT** long; **4,6-CT** short; **1,2,3-CT** usually single; **4-CT** with 3-5 branches; **5,7,8-CT** usually bifurcate; **6-CT** single; **9-CT** single.

*Trumpet* (figure 2): Strongly pigmented. Index 2.3-3.7; mode 3.0.

*Metanotum* (figure 3): **Setae 10,12-CT** long; **10,12-CT** usually triple; **11-CT** single.

*Abdomen* (figure 3): **Seta 0-II-VIII** minute, single; **seta 1-I** with 10-18 branches on basal one-third, **1-II-VII** moderately long, **1-II** usually with 6 branches, **1-III-IV** with 2-4 branches, **1-V-VII** usually double. **Seta 2-I-VII** short, **2-I,III,IV,VI,VII** single, **1-II,V** occasionally double. **Seta 3-I-III,V-VII** long, usually single, **3-IV** moderately short, usually double. **Seta 4-I,II** short, **4-III-VII** moderately long, **4-VIII** long, **4-I** pedunculate, with 3 or 4 branches, **4-II** usually with 4 branches, **4-III** usually trifurcate, **4-IV** usually double, **4-V** with 3-5 branches, **4-VI** usually double, **4-VII** single, **4-VIII** usually single. **Seta 5-I** short, pedunculate, usually double, **5-II,III,VII** moderately long, **5-IV** very long, **5-V-VII** long, **5-II-VI** usually single, **5-VII** double. **Seta 6-I,II** long, usually double, **6-III-VI** moderately long, usually single, **6-VII** moderately short with 3-5 branches. **Seta 7-I,II,VI,VII** long, **7-III,IV,V** short, **7-I** usually bifurcate, **7-II** usually trifurcate, **7-III,V** with 3 branches, **7-IV** usually double, **7-VI,VII** single. **Seta 8-III-VII** short; **8-III-V** double, **8-VI** usually with 3 branches, **8-VII** with 3-5 branches. **Seta 9-I** short, **9-II-VI** minute, **9-VII,VIII** moderately long, **9-I-VI** single, **9-VII** usually with 4 branches, **9-VIII** with 4-9 branches. **Seta 10-III-VII** long, **10-III,IV** usually bifurcate, **10-V-VII**. **Seta 11-III-VI** short, single, **11-VII** short, occasionally bifurcate. **Seta 14-III-VIII** minute, single.

*Paddle* (figure 3): Ovoid, basal 2/3 of outer margin slightly spiculate; inner margin without spicules. Midrib weakly sclerotised. **Seta 1-P** moderately long, occasionally bifurcate. Index 1.0-1.4; mode 1.2.

**Table 1.** Branching of the setae on pupae ( $n = 15$ ) of *Aedes vittatus* (range with the mode in parentheses)

Cephalothorax		Abdominal segments								Paddle
Seta	CT	I	II	III	IV	V	VI	VII	VIII	Pa
<b>0</b>			1	1	1	1	1	1	1	
<b>1</b>	1-2 (1)	10-18 (11)	5-9 (6)	2-4 (3)	2-4 (3)	1-4 (2)	2-4 (2)	1-3 (2)		1-2 (1)
<b>2</b>	1-2 (1)	1	1-2 (1)	1	1	1-2 (1)	1	1		
<b>3</b>	1	1-3 (1)	1-3 (1)	1-2 (1)	1-2 (2)	1-2 (1)	1	1-2 (1)		
<b>4</b>	3-5 (3)	2-5 (4)	3-6 (4)	2-3 (3)	1-2 (2)	3-5 (4)	2-4 (2)	1	1-2 (1)	
<b>5</b>	2-3 (2)	2-5 (2)	1-2 (1)	1-2 (1)	1	1	1	1-2 (2)		
<b>6</b>	1-2 (1)	1-2 (2)	1-3 (1)	1-2 (1)	1-2 (1)	1-2 (1)	1-2 (1)	3-5 (3)		
<b>7</b>	1-3 (2)	1-3 (2)	2-3 (3)	2-4 (3)	1-3 (2)	2-4 (3)	1-2 (1)	1		
<b>8</b>	1-3 (2)			2-3 (2)	1-3 (2)	2-3 (2)	2-4 (3)	3-5 (4)		
<b>9</b>	1	1	1	1	1	1	1	2-6 (4)	4-9 (7)	
<b>10</b>	2-4 (3)			1-2 (2)	1-2 (2)	1	1	1		
<b>11</b>	1-2 (1)			1	1	1	1	1-2 (1)		
<b>12</b>	2-4 (3)									
<b>13</b>										
<b>14</b>				1	1	1	1	1	1	

The above description is based on the following material collected by Dr. David Bravo in Teresa de Cofrentes on the region's mountainous border northwest of Valencia, Spain: 6 males and 9 females on 1 October 2005. Specimens studied were captured in a small rock-pool containing temporary brackish water. The habitat was similar to those described by Clavero (1946), Encinas Grandes (1982), Romi *et al.* (1997) and Schaffner *et al.* (2001).

Comparison of pupae from Nigeria and Valencia showed differences in the branching of various setae. Those from Nigeria differed as follows: seta 4-CT with 1-3 branches, 10-CT with 1 or 2 branches, 5-I with 5-7 branches, 4-III with 3-5 branches and 8-III with 3-5 branches. Further studies of these differences are necessary to discuss the taxonomic relationships between Spanish and Nigerian material.

*Aedes vittatus* has been considered a univoltine species, but some authors have described an additional generation in the early spring (Encinas Grandes, 1982; Romi *et al.*, 1997).

#### Acknowledgement

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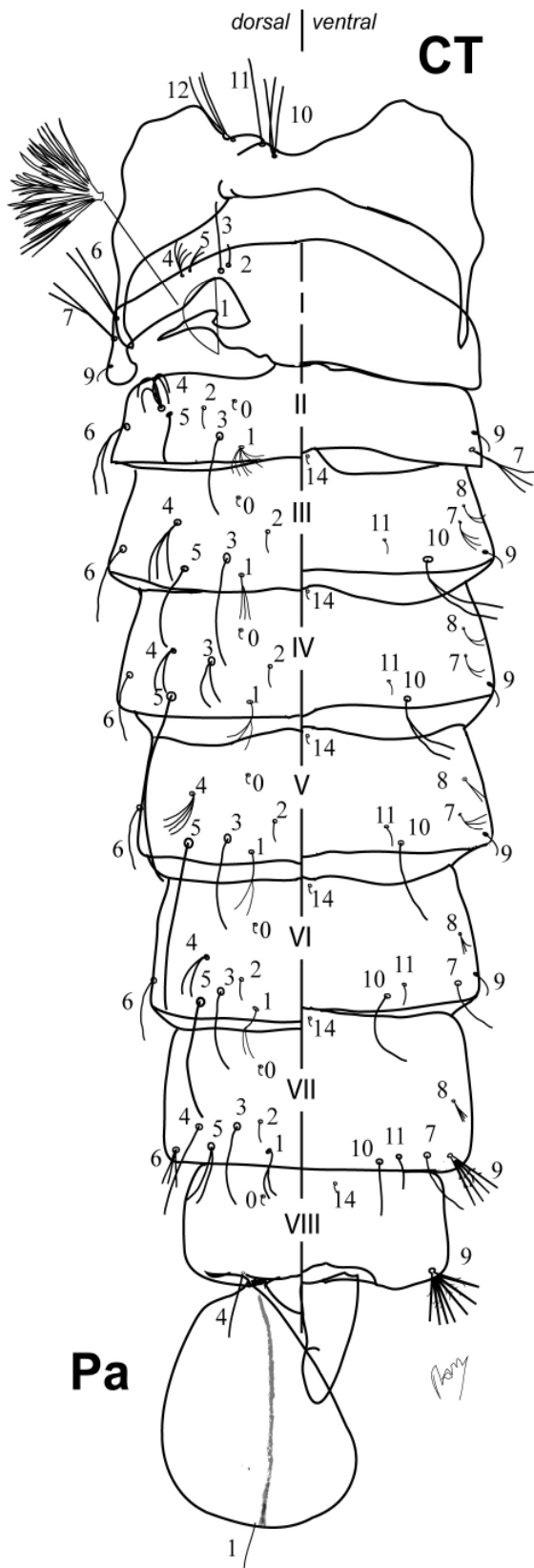


FIG. 3

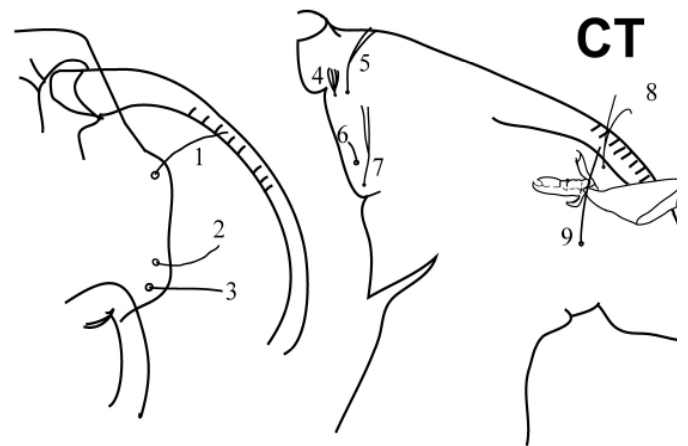


FIG. 1

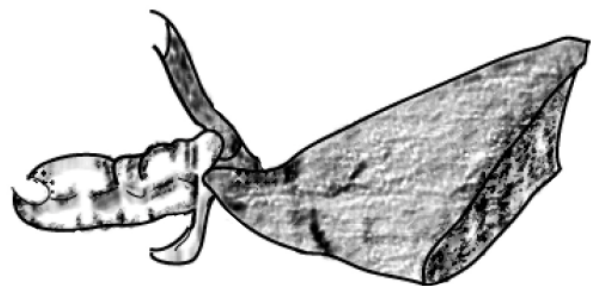


FIG. 2

**Figures 1-3. Pupa of *Aedes vittatus***

1. Cephalothorax (CT); 2. Trumpet; 3. Metanotum, abdomen and paddle (Pa); I-VIII abdominal segments.