

## REDESCRIPTION OF THE PUPA OF *CULEX (MELANOCONION) IOLAMBDIS* DYAR

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**ABSTRACT.** The pupa of *Culex iolambdis* is redescribed with the Belkin system of nomenclature, a table of setal branching, and an illustration.

**KEY WORDS** Pupa, *Culex iolambdis*

### INTRODUCTION

The pupa of *Culex (Melanoconion) iolambdis* Dyar was partially described by Foote (1954), Lane (1953), Pratt and Seabrook (1952), and Belkin et al. (1970). Although each gave a partial or complete illustration with or without some description, none presented either branching counts of all setae or measurements of relevant structures. Belkin et al. (1970) stated “not studied in detail,” whereas Foote (1954), Lane (1953), and Pratt and Seabrook (1952) did not use the revised nomenclature of Belkin (1962) and Harbach and Knight (1980), offered only a partial description if at all, failed to mention the main characters used in the key to the pupae of *Culex* of the eastern United States (Darsie and Day 2002), and illustrated only part of the pupa. Pecor et al. (1992) presented up-to-date information about all known species of subgenus *Melanoconion* Theobald. A helpful resume of the literature on *Cx. iolambdis* was obtained from this source, including references that dealt with the pupa. Pecor et al. (1992) also provided distributional records that indicated that this species is known from the United States, Greater Antilles, Mexico, Central America, Panama, and Venezuela. This study presents a complete account of the pupa of *Cx. iolambdis*.

### MATERIALS AND METHODS

Larvae were collected in coastal rock holes in Big Pine Key, Monroe County, Florida, by B. Hovanic and G. Schwartz and individually reared by L. Hribar. The specimens preserved in 80% alcohol were sent to the author and the exuviae were mounted in Canada balsam on microscope slides. Pupal identifications were made from associated larva exuviae or adults. The abbreviation br indicates branches and LePe refers to the larval and pupal exuviae.

### DESCRIPTION OF THE PUPA OF *CULEX IOLAMBDIS*

Position and size of setae as figured (Fig. 1); range and modal branching in Table 1. *Cephalothorax*: Very light tan, antenna, legs, and dorsal margins of the scutum darker brown. Seta 1-CT long, triple or

quadruple. Setae 2,4,6-CT moderately long; 2,4 with 2–4 br; 6 single or double. Setae 3,5,7,8,9-CT long; 3 usually triple; 5 with 4 or 5 br; 8 usually triple, seldom 4- or 5-branched; 9 double, seldom triple; 7 very long, double. Setae 10,11,12-CT long; 10 with 5–8 br; 11 single; 12 double or triple, rarely quadruple. *Trumphet*: Dark brown, except for area between apex of tracheoid and slit of pinna, which is light brown; length 0.53–0.63 mm,  $\bar{x}$  = 0.58 mm; index 7.7–9.0,  $\bar{x}$  = 8.5; tracheoid 0.20–0.33,  $\bar{x}$  = 0.28 of length; pinna 0.11–0.12 mm,  $\bar{x}$  = 0.118 mm, with narrow slit proximally, 0.33–0.54,  $\bar{x}$  = 0.37 length of pinna. *Abdomen*: Length 2.44–2.86 mm,  $\bar{x}$  = 2.61 mm, a dark brown spot on middle of intersegmental membrane between II, III, otherwise very light tan; a light reticular pattern in middle of segment I. Setae 0-II-VIII, 1-IX, 9-I-VI, 11-III-VI, and 14-III-VIII short to minute, single. Seta 1-I dendritic, with 6–10 primary branches; 1-II,III,VII moderately long, with 10–21 br on II; 10–12 br on III; 4 or 5 br on VII; 1-IV-VI long; with 5–9 br on IV,V and 3–5 br on VI. Seta 3 long on I-III,V,VI; single or double on III; double or triple, seldom single, on V,VI. Seta 3-IV,VII short; 4 or 5 br on IV; double or triple on VII. Seta 4-I-V short; with 5–7 br on I, usually triple or quadruple on II-V; 4-VI,VIII moderately long, usually double or triple; 4-VII long, single or double. Seta 5-I,II short, with 3–5 br; 5-III moderately long, with 4–6 br; 5-V-VII long to very long; with 3–5 br on IV,V; single or double on VI,VII. Seta 6-I,II very long, single, rarely double; 6-III-VI moderately long, usually triple or quadruple; 6-VII short, with 3–5 br. Seta 7-I,VI,VII long; usually double or triple on I; single on VI,VII; 7-III-V short, double or triple, seldom quadruple. Seta 8-III-VII short, with 2–5 br. Seta 9-VII,VIII long, stout, sometimes aciculate; double or triple on VII; 9-VIII located 0.14–0.28,  $\bar{x}$  = 0.19 of segment length anteriorly from posterolateral obtuse angle, with 3–6 primary br, sometimes forked apically. Seta 10-III-VII long; usually double, seldom single on III,VII; single, seldom double on IV-VI. Seta 11-VII short, double, seldom single. *Paddle*: Ovoid, light tan, midrib reaching to near apex, outer and inner margins smooth, length 0.67–0.80 mm,  $\bar{x}$  = 0.73 mm; index 0.68–0.82,  $\bar{x}$  = 0.72; male genital lobe 0.51–0.64 and female genital lobe 0.22–0.23 length of paddle; seta 1-P and 2-P short, single.

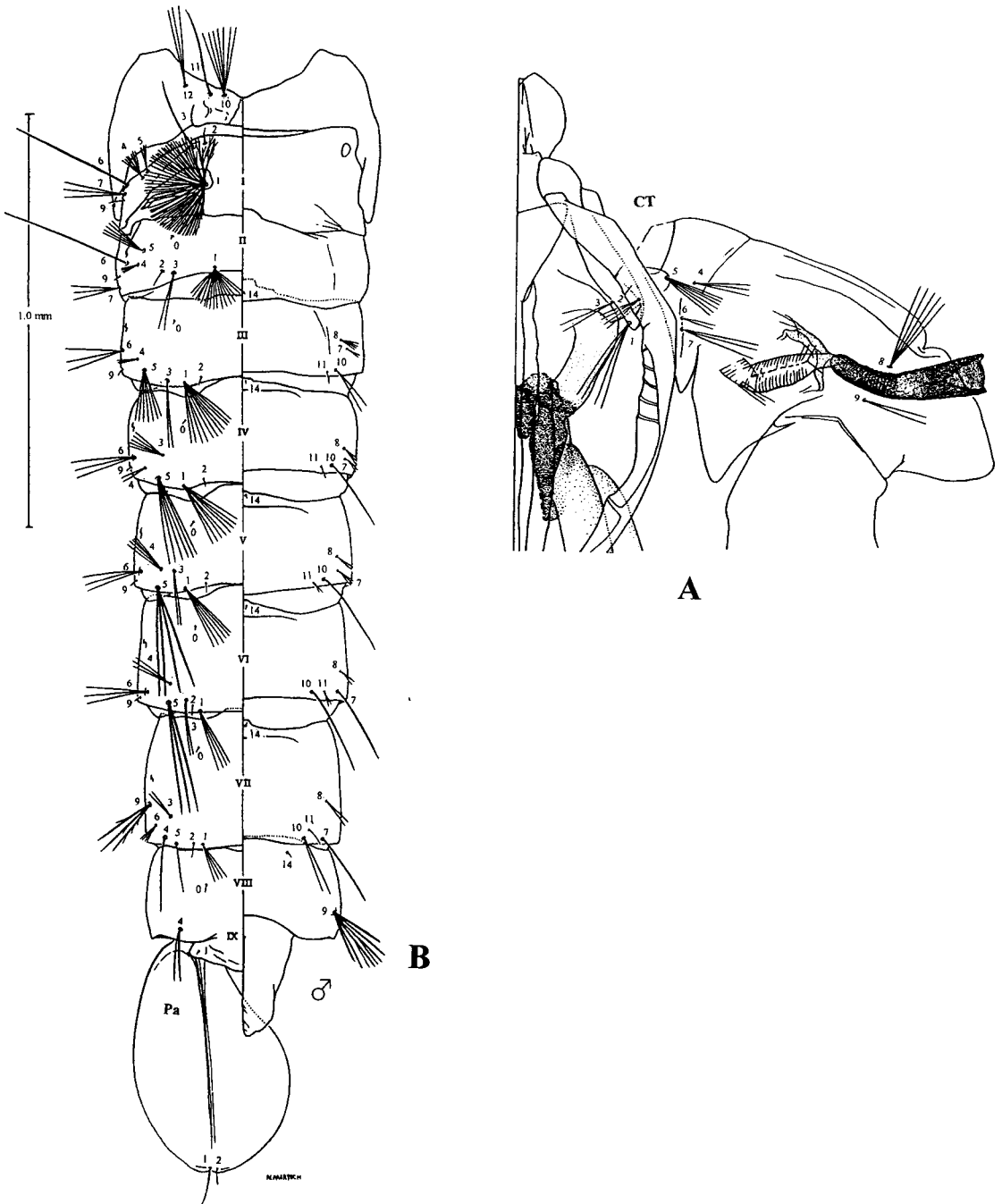


Fig. 1. The pupa of *Culex iolambdis*. (A) Cephalothorax; (B) metanotum and abdomen (adapted from Belkin et al. 1970). CT, cephalothorax; Pa, paddle.

**Specimens examined.** Florida, Monroe Co., Big Pine Key, III-20-01, 1 ♀, 1 ♂, LePe, 3 ♀, 1 ♂, Pe, ex coastal rock hole (Hovanic and Schwartz).

**Discussion.** Some differences of note are found between the pupae of *Cx. iolambdis* from Florida treated here and those described by others. Foote

(1954) recorded seta I-III with 6 or 7 branches among pupae from Florida and Panama, whereas those described here had 10-12 branches. Belkin et al. (1970) listed the siphon index as 6.0 for pupae from Jamaica, whereas an index of 7.7-9.0 was observed here. They also related that the proximal slit in the pinna of the

Table 1. The setal branching of the pupa of *Culex iolambdis* (range is followed in parentheses by the modal branching).

Seta	Cephalo- thorax	I	II	III	IV	V	VI	VII	VIII	IX	Pad- dle
0	—	—	1	1	1	1	1	1	1	—	—
1	3-4 (3)	6-10 (10)	10-21 (14)	10-12 (11)	5-9 (8)	6-8 (6)	3-6 (4)	4-5 (5)	—	1	1
2	2-4 (3)	1	1	1	1	1	1	1	—	—	1
3	2, 3 (2)	1	1, 2 (1)	1-5 (1)	4-5 (4)	2, 3 (4)	2, 3 (3)	1, 2 (2)	1-3 (2)	—	—
5	4-6 (5)	3-4 (3)	3-5 (4)	4-7 (6)	3-6 (5)	3-5 (4)	2, 3 (2)	1, 2 (1)	—	—	—
6	1, 2 (1)	1, 2 (1)	1	2, 3 (3)	3-4 (3)	3-4 (4)	3-4 (4)	3-5 (3)	—	—	—
7	2, 3 (2)	2-4 (3)	2, 3 (2)	2, 3 (2)	2, 3 (3)	2-4 (3)	1	1	—	—	—
8	3-5 (3, 4)	—	—	2-5 (4)	2-4 (3)	2, 3 (3)	2, 3 (3)	2-4 (3)	—	—	—
9	2, 3 (2)	1	1	1	1	1	1	2, 3 (3)	3-6 (4)	—	—
10	5-8 (?)	—	—	1, 2 (2)	1, 2 (1)	1	1	1, 2 (2)	—	—	—
11	1-3 (1)	—	—	1	1	1	1, 2 (1)	1, 2 (2)	—	—	—
12	2-4 (3)	—	—	—	—	—	—	—	—	—	—
14	—	—	—	1	1	1	1	1	1	—	—

trumpet was 0.35-0.4 of total pinna length, but the Florida pupae had slits 0.23-0.35 of the pinna length. Some of the pupae of *Cx. iolambdis* from Jamaica had the posterolateral angle of abdominal segment VIII produced and sometimes bearing small sharp, unnamed, caudal seta. This structure was absent in Florida pupae, which had an obtuse angle without a seta.

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