Entomology Circular 260
April 1984

Fla. Dept. Agric. & Consumer Serv.
Division of Plant Industry

LARVAE OF FRUIT FLIES. I. *Anastrepha ludens* (Mexican Fruit Fly) and *Anastrepha suspensa* (Caribbean Fruit Fly) (DIPTERA:TEPHRITIDAE)[1]

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INTRODUCTION: Fruit fly adults of Florida, plus exotics potentially of danger to Florida agriculture, have been discussed in several circulars by H. V. Weems, Jr. The present circular initiates a series on their larvae, primarily as an identification guide to the larvae of fruit flies of concern to Florida agriculture. The Mexican fruit fly (*Anastrepha ludens* (Loew)) and the Caribbean fruit fly (*Anastrepha suspensa* (Loew)) are both of economic concern to growers of citrus and a number of other tropical and subtropical fruits. Both species have been the subject of circulars on adult identification (Weems, 1963, 1965). Aspects of their biology, host plant records, and nomenclature will be found in these previous circulars.

MEXICAN FRUIT FLY: The Mexican fruit fly (*Anastrepha ludens* (Loew)) has not thus far become established in Florida. It occurs from northern South America to northern Mexico, penetrating into southern Texas. Occasionally it has been found in Arizona and is in southern California at this time (1984). It was detected in Florida once in 1972 but did not proliferate. However, it could easily become established here. Its preferred hosts include citrus (especially grapefruit), pear, peach, apple, white sapote, and mango. Many other fruits have been recorded as hosts (Weems, 1963; Pruitt, 1953).

CARIBBEAN FRUIT FLY: The Caribbean fruit fly (*Anastrepha suspensa* (Loew)), although relatively widespread in the West Indies, was not identified in Florida until 1930. This early introduction was eradicated. Since 1965, however, a new introduction of the pest into Florida has continued to spread and it now occurs in most of southern peninsular Florida, commonly north to Citrus and Volusia counties, with isolated records north to Jacksonville (Ibrahim, 1980). It has now developed into the main fruit fly problem for citrus and several other crops in Florida. Preferred hosts are guava, Surinam cherry, roseapple, peach, and tropical almond (Weems, 1965). Nearly 60 hosts have been recorded for Caribbean fruit fly to date, including several *Citrus* species (Ibrahim, 1980).

LARVAL IDENTIFICATION: Mexican fruit fly and Caribbean fruit fly larvae (last instars) may be separated as follows (future keys will include other species):

1. Anal lobes usually bifid (each lobe split); buccal carinae 12-14; anterior spiracles usually with 18 tubules (rarely 12-18); caudal end with dorsal papillules in each pair as widely separated as in each pair of intermediate papillules (distance between D1 & D2 = I1 & I2), and "lateral" papillules apparently only "single" (papillule I3 not prominent); ventral papillules prominent; posterior spiracles elongated (ca. 1 X 5) and separated medially by approximately 3 X the length of 1 spiracle.....*A. ludens*

2. Anal lobes always entire; buccal carinae 8; anterior spiracles with 12-13 tubules; caudal end with dorsal papillules in each pair distinctly closer together than those of each pair of intermediate papillules (distance between D1 & D2 half that of I1 & I2), and "lateral" papillules with a distinct "pair" of papillules on each side of the posterior spiracles (I3 prominent); ventral papillules usually indistinct; posterior spiracles of average length (ca. 1 X 3) and separated medially by approximately 2 X the length of 1 spiracle.....*A. suspensa*

Key identification characters for *Anastrepha ludens* and *A. suspensa*, respectively, are the number of buccal carinae (usually either 12 or 8), the number of tubules on the medially concave anterior spiracles (usually either 18 or 12), the type of anal lobe (usually either bifid or entire), and the papillule configuration on the caudal end (especially the closeness of D1 to D2, in relation to I1 and I2, and how distinct I3 and V1 are). Early instar larvae appear to conform to these major characters as well, but extra care should be taken in their identification and variations should be anticipated.

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LARVAL DESCRIPTION:

1. Mexican Fruit Fly (A. ludens): Larva white with typical fruit fly larval shape (cylindrical, elongated, anterior end usually somewhat recurved ventrally and with mouth hooks, flattened caudal end, 8 ventral fusiform areas (1 indistinct), 11 segments to body); last instars usually 9-12 mm in length. Anterior buccal carinae (Fig. 1) 12-14. Cephalo-pharyngeal skeleton (Fig. 7) with relatively large convex mouth hook (length 2 X width), with hypostome of nearly equal width; dorsal bridge enlarged; pharyngeal plate longer than dorsal wing plate and with a long pharyngeal support. Anterior spiracles (Fig. 3) slightly asymmetrical, with a median depression, usually 18 tubules present (rarely 12-18). Caudal end (Fig. 9) with paired dorsal (D1 & D2) and intermediate (I1 & I2) papillules, plus an indistinct I3; prominent L1 and V1; DI & D2 acutely angled (ca. 45°) and as widely separated as I1 & I2; I1 & I2 less acutely angled (ca. 30°); I1, I3, and L1 approximately in a straight line (at ca. 30°) and I3 almost equidistant from L1 and I2. Posterior spiracles (Fig. 11) elongated (ca. 5 X width), with dorsal 2 angled upward and ventral one angled downward on each side of median; interspiracular processes (hairs) mostly branched distally. Anal lobe (Fig. 5) usually bifid, but sometimes entire (the anal lobe variation requires further study to determine if this represents 1 or 2 species, or a hybrid). [Described from USNM lot from Chihuahua, Mexico.]

2. Caribbean fruit fly (A. suspensa): Larva as above, a typical fruit fly larva, but with 10 fusiform areas visible; last instar larvae about 8-10 mm in length. Anterior buccal carinae (Fig. 2) normally 8. Cephalo-pharyngeal skeleton (Fig. 8) with relatively large mouth hook (length 2 X width) with hypostome of nearly equal width; dorsal bridge enlarged; pharyngeal plate longer than dorsal wing plate and with a long pharyngeal support. Anterior spiracles (Fig. 4) slightly asymmetrical, with a median depression; 12-13 tubules present. Caudal end (Fig. 10) with paired dorsal (D1 & D2) and intermediate (I1 & I2) papillules, plus a distinct I3; prominent L1; indistinct V1 (rarely somewhat prominent); D1 & D2 acutely angled (ca. 45°) and closer together than I1 & I2 (ca. ½ distance); I1 & I2 almost in a horizontal line (ca. 10-15°); I1, I3, and L1 approximately in a straight line (at ca. 30°) and I3 twice as distant from I1 as from L1. Posterior spiracles (Fig. 12) elongated (ca. 3-3.5 X width), with dorsal 2 angled upward and ventral one angled downward on each side of median; most interspiracular processes (hairs) usually not branched distally. Anal lobe (Fig. 6) always entire. [Described from USNM and FSCA lots from Puerto Rico and Florida.]

DISCUSSION: The larval descriptions herein were made from reared and verified specimens from the U. S. National Museum of Natural History (USNM), Washington, and from other identified lots of larval specimens at the Florida State Collection of Arthropods (FSCA). Nonetheless, these specimens did not result in a configuration of the cephalo-pharyngeal skeleton exactly as published in illustrations of Phillips (1946) and Pruitt (1953). Various populations of each fruit fly species evidently exhibit variations in this and other characters that need to be taken into account. The main characteristics, however, of each species appear to be constant and allow relatively easy identification. The cephalo-pharyngeal skeleton is not usually examined in routine identifications because the larval specimen must be dissected before this character can be examined.

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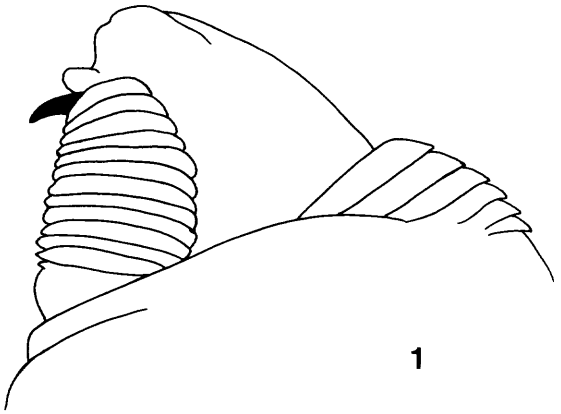

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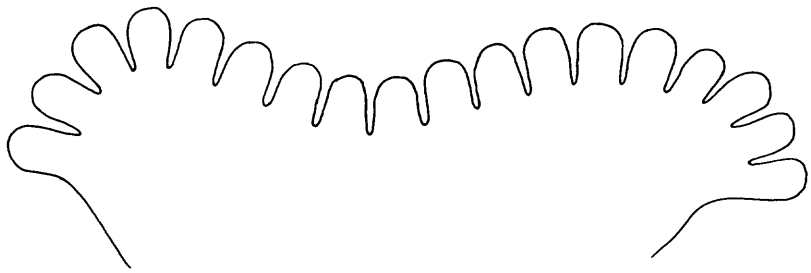

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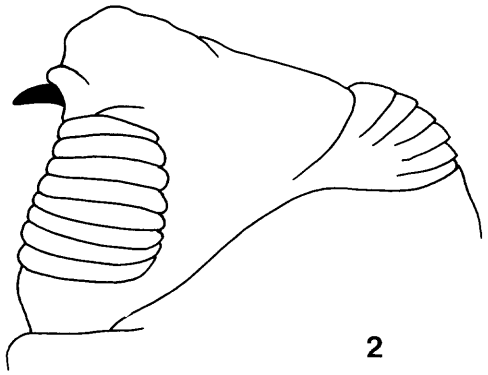

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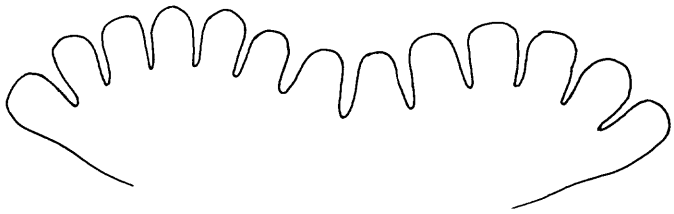

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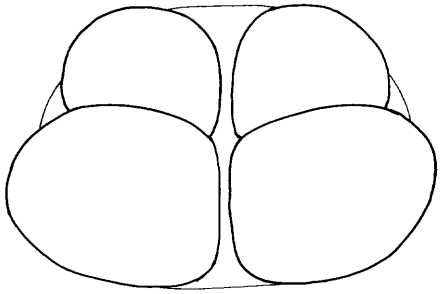

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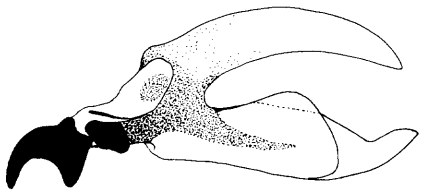

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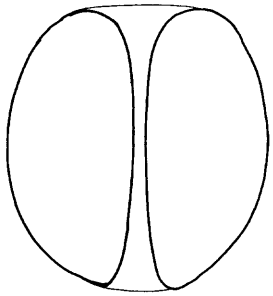

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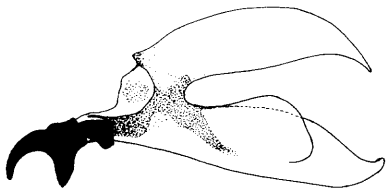

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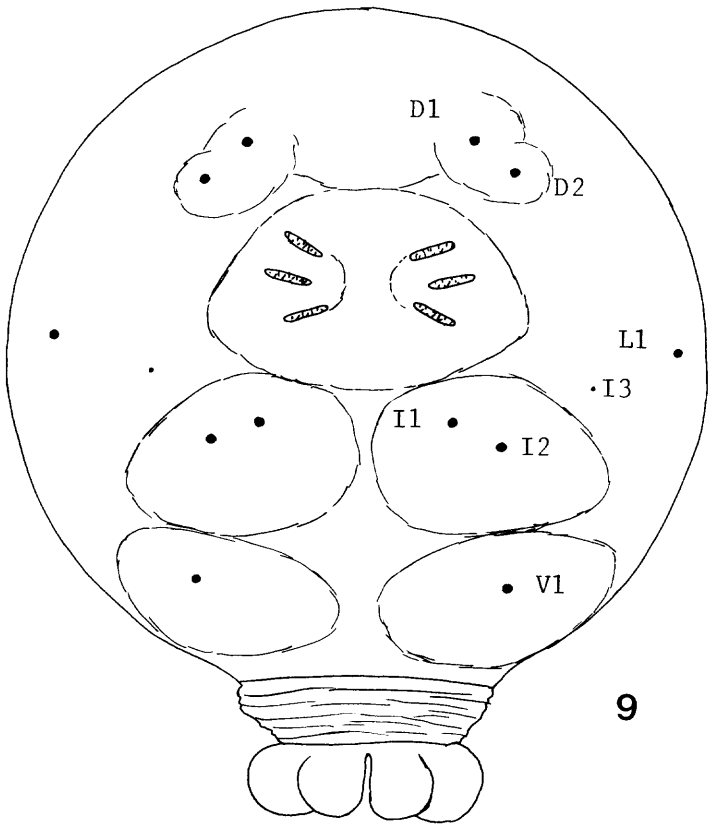
Fig. 1-8. Anastrepha ludens (Loew) larval details: 1, buccal carinae (lateral view); 3, anterior spiracles; 5, anal lobes; 7, pharyngeal skeleton (lateral dissected view). Anastrepha suspensa (Loew): 2, buccal carinae (lateral view); 4, anterior spiracles; 6, anal lobes; 8, pharyngeal skeleton (lateral dissected view).



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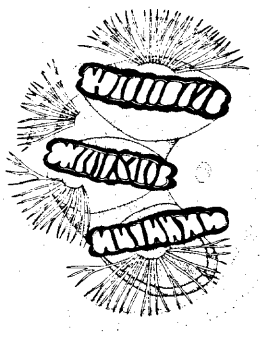

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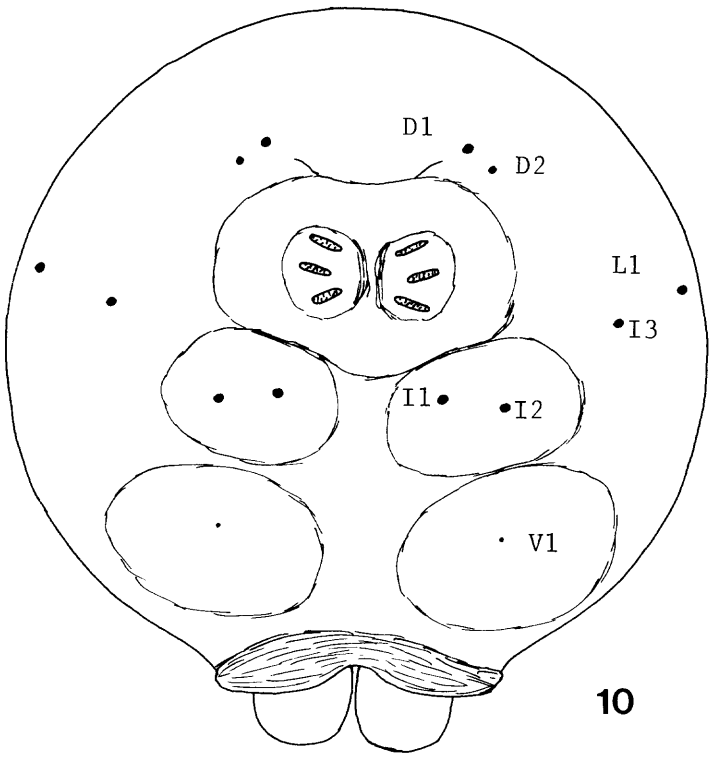

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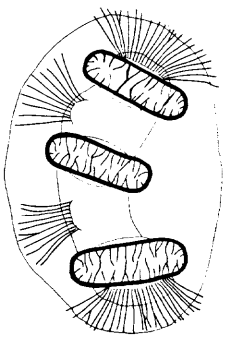

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Fig. 9-10. Caudal end of larvae; 9, Anastrepha ludens (Loew); 10, Anastrepha suspensa (Loew).

Fig. 11-12. Posterior spiracles (left groups): 11, Anastrepha ludens (Loew) (after Phillips, 1946); 12, Anastrepha suspensa (Loew).