

## Melon Fly, *Bactrocera cucurbitae* Coquillett (Insecta: Diptera: Tephritidae)<sup>1</sup>

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### Introduction

Within its range, the melon fly, *Bactrocera cucurbitae* Coquillett, is one of the most important pests with which vegetable growers have to contend. Although found in Hawaii, it is not present in the continental United States.



**Figure 1.** Adult melon fly, *Bactrocera cucurbitae* Coquillett.  
 Credits: Scott, Bauer, USDA

### Synonyms

*Bactrocera cucurbitae* Coquillett has also been known as:

*Chaetodacus cucurbitae* (Coquillett)

*Dacus cucurbitae* Coquillett

*Strumeta cucurbitae* (Coquillett)

*Zeugodacus cucurbitae* (Coquillett)

### Distribution

The melon fly is well distributed over most of India, which is considered its native home, and throughout most of southeastern Asia, the Mariana Islands, and the Hawaiian Islands. It was introduced into the Hawaiian Islands from Japan about 1895, and by 1897, when it was first observed, it was already a serious pest. Other populations are reported in Africa (Egypt, Kenya and Tanzania), all of southeast Asia as far north as Nepal and China as far west as Pakistan, the islands in the New Guinea area, Philippines, and Taiwan.

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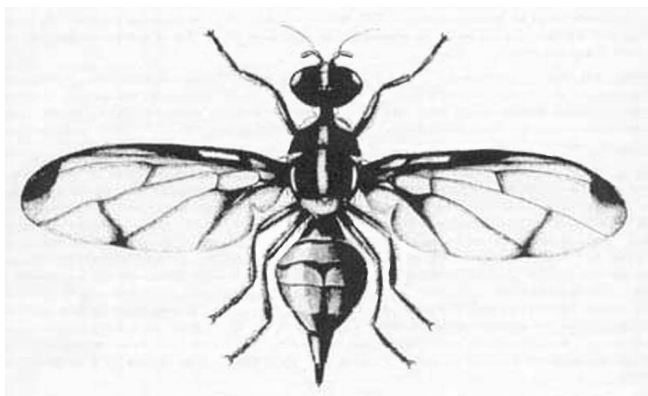
It is not established in the continental United States, although a single specimen was collected during July 1956 in Los Angeles County, California, in a glass McPhail trap baited with an aqueous solution of brown sugar, brewers' yeast, and pyridine. Plant quarantine inspectors at west coast ports of entry have made many interceptions in various hosts from Hawaii and occasionally from the Asiatic area. Other interceptions have been made at Houston, Texas; Mobile, Alabama; and Boston, Massachusetts.

## Identification

**Adult:** The adult fly is 6 to 8 mm in length. Distinctive characteristics of the adult are the wing pattern, long third antennal segment, the dorsum of the thorax reddish yellow with light yellow markings and without black markings, and the head yellowish with black spots.



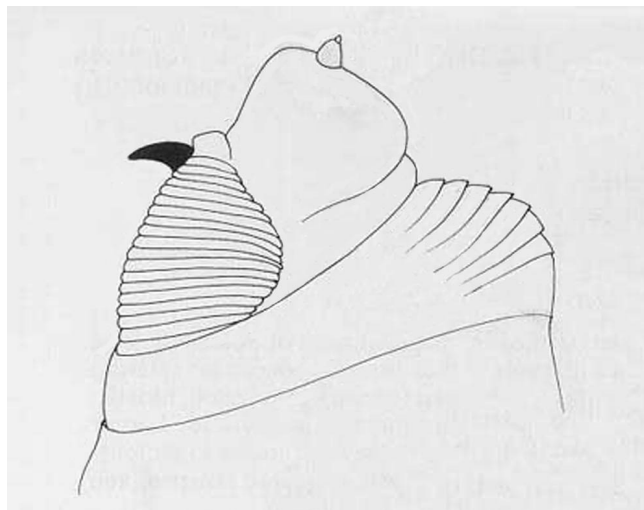
**Figure 2.** Adult female melon fly, *Bactrocera cucurbitae* Coquillett. Credits: Jack Clark, University of California



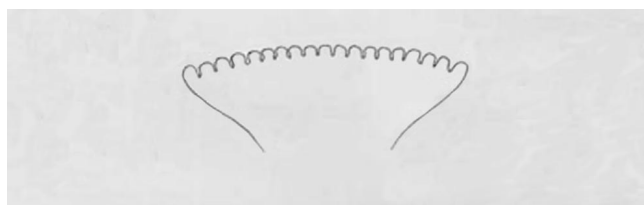
**Figure 3.** Adult female melon fly, *Bactrocera cucurbitae* Coquillett, showing wing venation. Credits: Division of Plant Industry

**Egg:** The egg is pure white, about 2 mm long, elliptical, nearly flat on the ventral surface, more convex on the dorsal. Eggs often are somewhat curved.

**Larva:** The larva has three stages. Larva white (except as appearances are altered by the color of the food within the alimentary canal); typical fruit fly shape (cylindrical-maggot shape, elongate, anterior end narrowed and somewhat curved ventrally, with anterior mouth hooks, ventral fusiform areas and flattened caudal end); last instar larvae range from 7.5 to 11.8 mm in length; venter with fusiform areas on segments 2 through 11 (2 through 4 are weakly developed); anterior buccal carinae usually 18 to 20 in number; anterior spiracles slightly convex in lateral view, with tubules averaging 18 to 20 in number and relatively small.



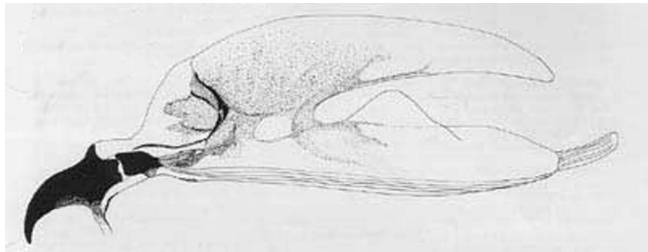
**Figure 4.** Head and buccal carinae of larva of the melon fly, *Bactrocera cucurbitae* Coquillett. Credits: Division of Plant Industry



**Figure 5.** Anterior spiracle.

Cephalo-pharyngeal skeleton with large, sharply pointed convex mouth hook each side, with prominent dorsal lobe, and each hook about 3X hypostome length; hypostomium with prominent, semi-rounded subhypostomium; post-hypostomial plates curved to dorsal bridge, fused with sclerotized

rays of central area of dorsal wing plate; parastomium prominent; dorsal wing plate with posterior ray split; dorsal bridge relatively unsclerotized except on posterior curve to pharyngeal plate; a prominent hood on pharyngeal plate and several striae ventrally.



**Figure 6.** Cephalo-pharyngeal skeleton (left side) of larva of the melon fly, *Bactrocera cucurbitae* Coquillett. Credits: Division of Plant Industry

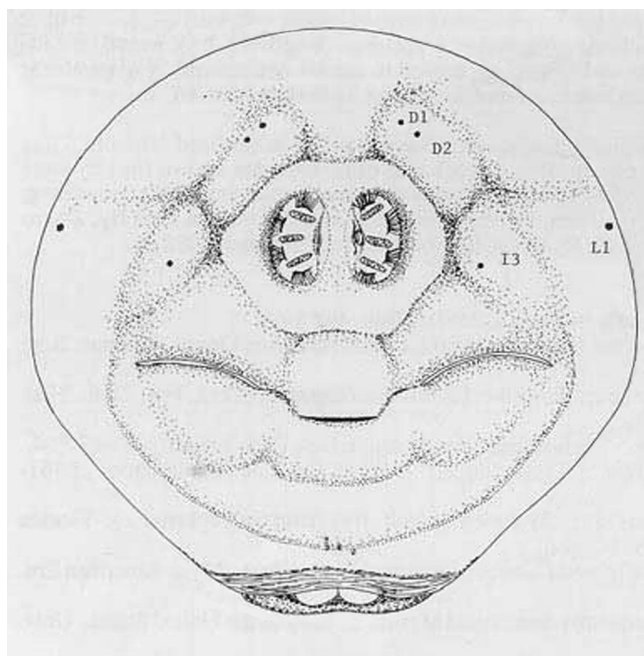
Caudal end with paired dorsal papillules (D1 and D2) diagonally dorsad each spiracular plate; intermediate papillules as a curved ridge to each side, with a prominent central dark line below spiracles about midway between spiracles and anal lobes, but with I3 to each side of spiracles; L1 on median edge of caudal end; ventral papillules not evident on raised plates; posterior spiracles as three elongated oval openings (length = 3 to 3.5X width) on each kidney-shaped spiracular plate, with dorsal spiracles and lower pair angled to caudal end center; interspiracular processes (hairs) numerous, at 4 sites on each plate, tips bifurcate; anal lobes entire and small.

The larva of the melon fly is particularly distinctive in having a dark sclerotized horizontal line below the spiracular region on the caudal end, with a curved ridge on each side of it. No other known fruit fly larva has this combination of characters, plus other features of the anterior spiracles and cephalo-pharyngeal skeleton (Berg 1979, Chu 1949, Green 1929, Hardy 1949, Phillips 1946, Pruitt 1953).

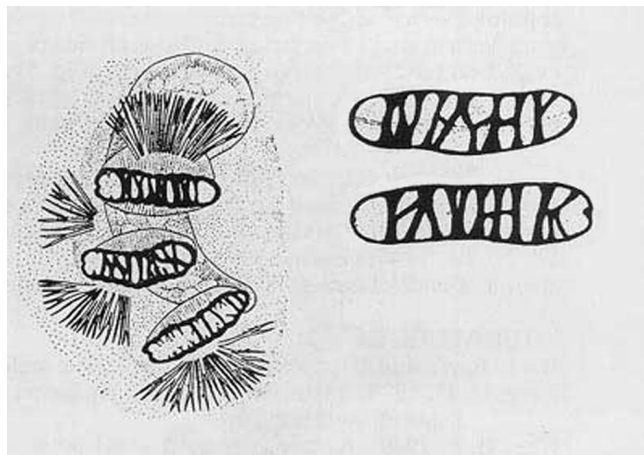
**Pupa:** The puparium is about 5 to 6 mm in length and varies in color from dull red or brownish yellow to dull white, according to host.

### Life History

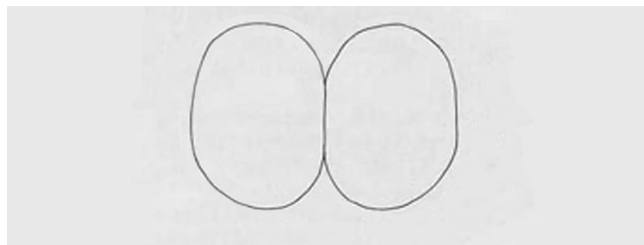
Development from egg to adult under summer conditions requires from 12 to 28 days, according to the individual and to host and weather conditions.



**Figure 7.** Caudal end of last instar larva of the melon fly, *Bactrocera cucurbitae* Coquillett. Credits: Division of Plant Industry



**Figure 8.** Posterior spiracles (left side) (after Phillips 1946) with detail of two spiracle slits, from the larva of the melon fly, *Bactrocera cucurbitae* Coquillett. Credits: Division of Plant Industry



**Figure 9.** Anal lobes. Credits: Scott, Bauer, USDA

The developmental periods may be extended considerably by cool weather. The length of the stages in the Philippine Islands, at an average

temperature of 86 F, was 1.73 days for eggs, 4 to 9 days for larvae, and 7 to 11 days for pupae. Laboratory tests in Hawaii prolonged the egg stage to 11 days, the larval stage to 30 days, and the pupal stage to 51 days, by exposing specimens to low temperatures. In the Philippines the preoviposition period lasted 7 to 26 days and the oviposition period 39 to 95 days. A single hardy female may lay as many as 1,000 eggs. Eggs generally are laid in young fruit, although they are laid also in succulent stems of many host plants, in cavities made with the aid of a sharp ovipositor. Only ripe fruit of some hosts are attacked. Pupation normally occurs in the soil, usually beneath the host, at a depth ranging downward to 2 inches. Adults may live more than a year. Adults feed primarily upon juices of host plants, nectar, and honeydew secreted by various kinds of insects. There may be as many as eight to 10 generations a year.

### Damage

In the Indo-Malayan region, the melon fly, sometimes called the melon fruit fly, is considered the most destructive pest of melons and related crops, and it has greatly curtailed the production of melons, cucumbers, and tomatoes in Hawaii. The extensive damage caused by this fly in areas similar to Florida where it has become established indicates that this species could rapidly become a very serious pest of cucurbits and other truck crops, and possibly of some fruit crops, if it were to be introduced into Florida and be permitted to become established.

In common with some other species in *Bactrocera*, the melon fly can attack flowers as well as fruit, and additionally will attack stem and root tissue. In Hawaii, pumpkin and squash have been heavily attacked even before the fruit had set, with eggs laid into unopened male and female flowers, and larvae successfully developing in the taproots, stems and leaf stalks.

### Hosts

More than 125 species of plants, including cucurbits, tomatoes, and many other vegetables, have been recorded as hosts of the melon fly. Preferred hosts include cantaloupe, watermelon, pumpkin, squash, gourd, cucumber, tomato, string bean, and

cowpea. However, White and Elson-Harris state that many of these records may have been based on casual observations of adults resting on plants or caught in traps set in non-host trees.

Occasional hosts include eggplant, orange, papaya, mango, peach, and fig. Wild hosts include passion-flower, *Passiflora* spp.; balsam apple; *Diplocyclos palmatus*; colocynth; *Cucumis trigonus*; and two genera of cucurbits -- *Sicyos* sp. and Chinese cucumber, *Momordica* spp.

### Management

As *Bactrocera cucurbitae* Coquillett is not found in the continental United States there are no specific management recommendations for its control in Florida. In the Solomon Islands it was subjected to an eradication campaign using a combination of bait spraying and male annihilation traps. In the Ryukyu Islands it was eradicated from some islands using the sterile insect technique. *Psytalia fletcheri* (Silvestri) is the only fruit fly parasitoid introduced into Hawaii capable of parasitizing *B. cucurbitae*.



**Figure 10.** Adult fruit fly parasitoid, *Psytalia fletcheri* (Silvestri). Credits: Scott, Bauer, USDA

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