

A Citrus Blackfly Parasitoid, *Encarsia perplexa* Huang & Polaszek (Insecta: Hymenoptera: Aphelinidae)¹

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Introduction

Encarsia perplexa Huang & Polaszek is one of the most effective parasitoids of the citrus blackfly, *Aleurocanthus woglumi* Ashby (Hemiptera: Aleyrodidae). It was originally misidentified as *Encarsia opulenta* (Silvestri), but was later determined to be a new species (Huang and Polaszek 1998).

In 1950, *E. perplexa* from Saharanpur (India) were released for the control of *A. woglumi* in Mexico (Flanders 1969). The parasite was then introduced to Texas in 1971 (Summy et al. 1983), and Florida in 1976 (Hart et al. 1978) to suppress and maintain under the economic threshold the population of the citrus blackfly in these states.

Distribution

Encarsia perplexa is reported as native to Asia (Vietnam and India) (Silvestri 1927, Smith et al. 1964), (Huang and Polaszek 1998), and was introduced to Barbados, Cuba, Salvador, Kenya, Jamaica, Oman, Mexico, Venezuela, and the USA

(Texas and Florida) to control the citrus blackfly. In Florida, the parasite is found in south and central Florida where citrus blackfly occurs (Nguyen et al. 1983).

Description

The females are small (1.10 mm long) with the thorax whitish to pale yellowish. The antennae are 0.8 mm long, 8-segmented, and the 1st flagellum is shorter than the pedicel or other flagella. The wings are slightly shady in the center. Abdomenial segments 3 to 6 are dark brown, with the remainder being yellowish. Ovipositors are dark and 0.5 mm long.

Male *E. perplexa* are smaller than females, with males averaging 0.75 mm long and are different in color. The body and head of the males is dark brown. Male antennae are 8-segmented, with the 1st flagellum almost round and wider than the succeeding segment (Silvestri 1927, Grissell 1979).

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Figure 1. A) Adult *Encarsia perplexa* Huang & Polaszek; and (B) pupal cases of the citrus blackfly, *Aleurocanthus woglumi* Ashby, from which parasitoids have emerged (see roundish black holes). Normal emergence of an adult blackfly would leave a T-shaped split in the pupal case. Credits: Division of Plant Industry



Figure 2. Adult female *Encarsia perplexa* Huang & Polaszek. Photograph by: Ron Heu and Walter Nagamine, Hawaiian Department of Agriculture

Life Cycle

The female can live longer than 30 days with adequate nutrition and displays good searching ability. A mated female lays a single diploid egg in any nymphal stage of the citrus blackfly, but prefers the second stage, and this egg will produce a female.

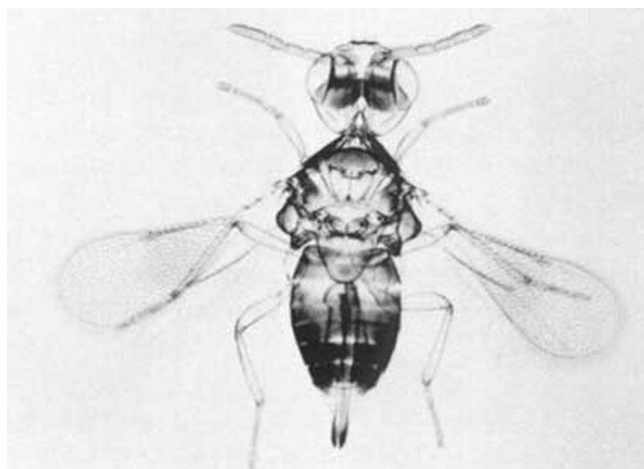


Figure 3. Adult female *Encarsia perplexa* Huang & Polaszek. Credits: Division of Plant Industry

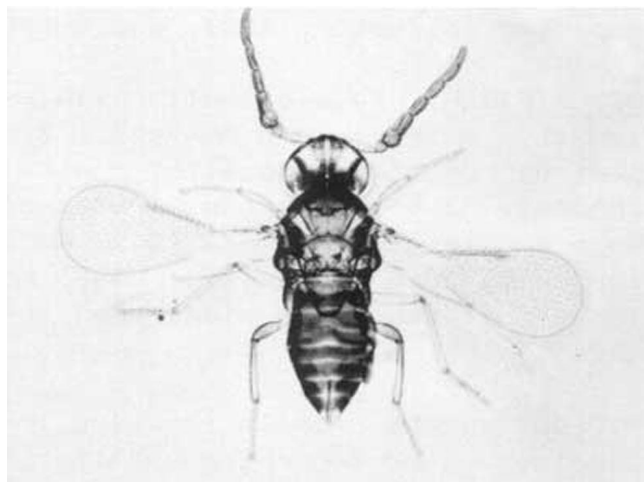


Figure 4. Adult male *Encarsia perplexa* Huang & Polaszek. Credits: Division of Plant Industry

Under laboratory conditions (24°C) the development from egg to adult requires 30 to 35 days. Virgin females lay haploid eggs in the fully developed larva of the *E. perplexa* female (their own species) and thereby produce males (adelpho-parasite). The sex ratio in the field is about 1:7 (male:female). *Encarsia perplexa* is hyperparasitized by *E. smithi* (Silvestri) which was accidentally introduced to Florida by 1979.

In Florida, *E. perplexa* and *Amitus hesperidum* (Hymenoptera: Platygastidae) coexist. The latter has a high rate of reproduction, and can produce 60 to 70 progeny per female making this species very effective in suppressing high densities of the citrus blackfly. *Encarsia perplexa* reproduces very slowly, but effectively limits *A. woglumi* when populations are at

a low level in Florida (Nguyen et al. 1983, Nguyen and Sailer 1987, and Flanders 1969).

Hosts

Aleurocanthus woglumi Ashby and *A. incertus* Silvestri are the only hosts reported (Silvestri 1927, Smith et al. 1964). When the adult parasitoid emerges from the blackfly pupal case, it leaves a roundish black hole. Normal emergence of an adult blackfly would leave a T-shaped split in the pupal case.

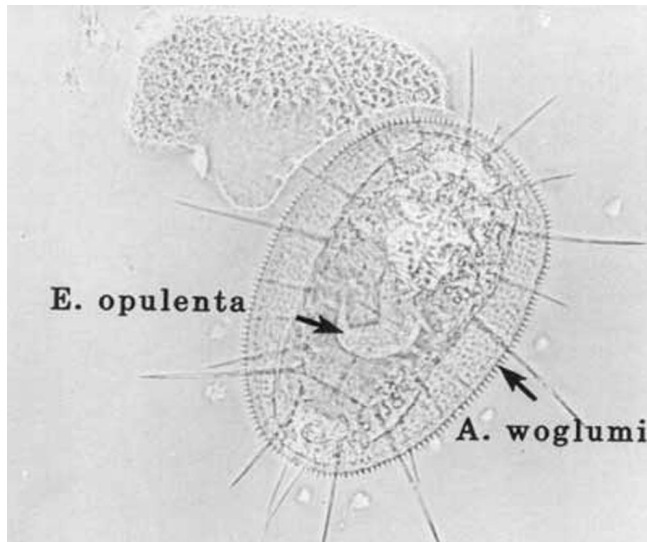


Figure 5. A larva of *Encarsia perplexa* Huang & Polaszek in a nymph of the citrus blackfly, *Aleurocanthus woglumi* Ashby. *Encarsia perplexa* was originally misidentified as *Encarsia opulenta* (Silvestri), but was later determined to be *E. perplexa*. Credits: Division of Plant Industry

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