

Tawny Emperor Butterfly *Asterocampa clyton* (Boisduval & LeConte) (Insecta: Lepidoptera: Nymphalidae: Apaturinae)¹

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The Featured Creatures collection provides in-depth profiles of insects, nematodes, arachnids, and other organisms relevant to Florida. These profiles are intended for the use of interested laypersons with some knowledge of biology as well as academic audiences.

Introduction

The tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), is a medium sized, rather nondescript butterfly that is particularly common in riparian forests but is also found in dry woods and suburbs (Opler et al. 2011). It is often found in association with the [hackberry emperor](#), *Asterocampa celtis* (Boisduval and LeConte), which is usually more abundant. Competition between the two closely related species may be reduced by the fact that tawny emperor larvae often feed on older foliage whereas hackberry emperor larvae prefer new foliage (Cech and Tudor 2005).



Figure 1. A newly emerged adult female tawny emperor *Asterocampa clyton* (Boisduval & LeConte), clinging to its pupal exuviae.

Credit: Donald Hall, University of Florida

Detailed historical information on the taxonomy and nomenclature of the tawny emperor is found in the Catalog of the Butterflies of the United States and Canada (Pelham 2008).

Distribution

The tawny emperor is found from southern New England south to Florida, and west to North Dakota and southern Arizona (Opler and Krizek 1984, Opler et al. 2009). It is common in northern and central Florida in association with its host plants but is more local in southern Florida (Minno et al. 2005).

Description

Adults

The wing spread of adults is 2–2 5/8 inches (5–6.7 cm) (Allen 1997). Females are much larger than males (Minno and Minno 1999). Adults are somewhat variable regionally and the variants have previously been considered separate species (Glassberg et al. 2000). Gatrell (1999) has published photographs of some of the color variants of *Asterocampa clyton* and *Asterocampa celtis* that occur in South Carolina and Florida. All specimens pictured here are from Alachua County, Florida.

The wings are brown to orange-brown. Adults may be distinguished from those of the hackberry emperor by the two complete dark bars in the front wing cell and the lack of a sub-marginal dark eyespot on the front wings. Also, the hackberry emperor has rows of pure white spots on the upper front wings that are pale yellow in the tawny emperor. Males can be differentiated from females by their smaller size and the concave outer margins of their wings.



Figure 2. An adult female tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), with wings open.
Credit: Donald Hall, University of Florida

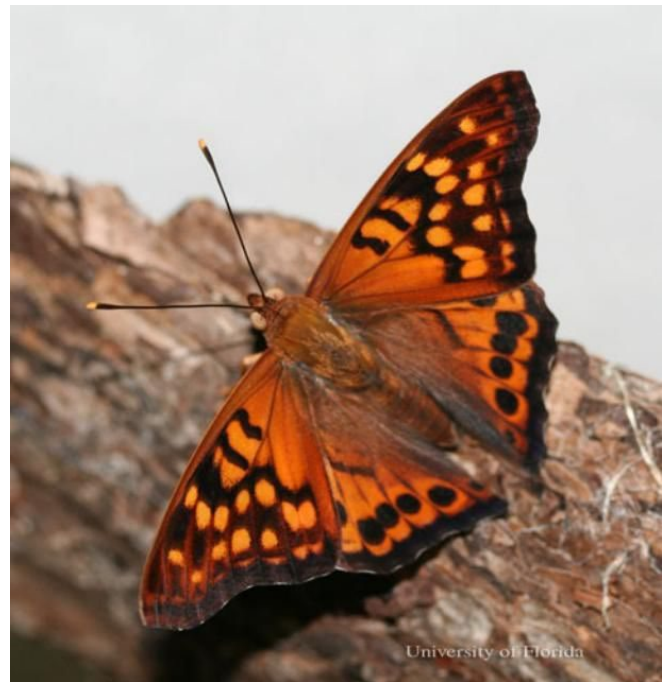


Figure 4. An adult male tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), with wings open.
Credit: Donald Hall, University of Florida



Figure 3. An adult female tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), with wings closed.
Credit: Donald Hall, University of Florida



Figure 5. An adult male tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), with wings closed.
Credit: Donald Hall, University of Florida

Eggs

Eggs are white but become darker before hatching.



Figure 6. Eggs of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).
Credit: Donald Hall, University of Florida

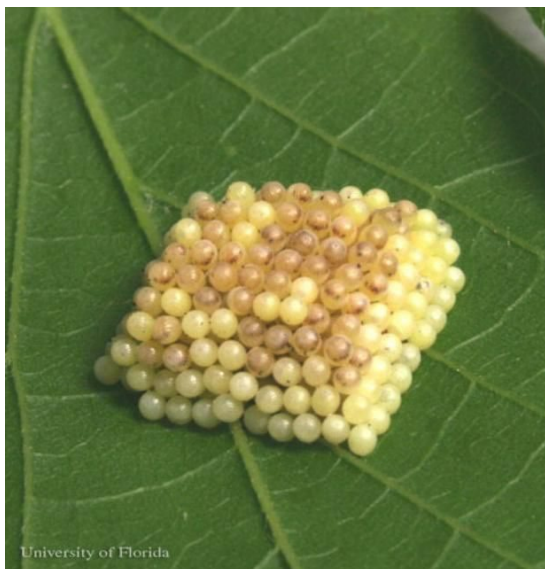


Figure 7. Eggs of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), one day before hatching
Credit: Donald Hall, University of Florida

Larvae

Full grown larvae are approximately 1.5 inches (3.8 cm) in length (Minno et al. 2005). The body is green with yellow and white longitudinal stripes, a dark blue-green mid-dorsal line, and a pair of short tails on the posterior end. The shield-like head has short spines on the sides and a pair of short, black-tipped horns on top (Minno et al. 2005). See Wagner (2005) for excellent drawings comparing the cephalic horns and lateral spines of the tawny and hackberry emperors.



Figure 8. A fourth instar larva of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), lateral view.
Credit: Donald Hall, University of Florida



Figure 9. A full-grown larva of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), lateral view.
Credit: Donald Hall, University of Florida



Figure 10. A full-grown larva of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), dorsal view.
Credit: Donald Hall, University of Florida



Figure 11. Anterior view of head of a larva of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), showing cephalic horns.

Credit: Donald Hall, University of Florida

Before pupation, the prepupal larva spins a silk pad and attaches to it with its terminal prolegs. It then becomes inactive and fades to a pale green color.



Figure 13. Lateral view of recently pupated tawny emperor, *Asterocampa clyton* (Boisduval & LeConte). Note the fifth (last) instar larval exuviae to the left of the pupal point of attachment.

Credit: Donald Hall, University of Florida



Figure 12. Pre-pupal larva of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).

Credit: Donald Hall, University of Florida

Pupae

Mature pupae are green with small yellow spots and a yellow mid-ventral line that branches and runs to the tips of two horns at the anterior end of the pupa. There are also two yellow lateral lines and diagonal yellow lines on the sides of the abdomen. Each abdominal segment has a dark dot at the anterior end on each side of the mid-ventral line. The pupa is attached to a silk pad by the cremaster (hooked spines on tip of pupa). Pupae are virtually identical to those of the hackberry emperor except for the thin yellow lines that are white in the hackberry emperor.



Figure 14. Dorsal view of pupa of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).

Credit: Donald Hall, University of Florida

Life Cycle and Biology

There is a single generation in the northern United States (Opler and Krizek 1984, Opler et al. 2011), but there are three generations in Florida and southern Louisiana (Israel 1982, Minno et al. 2005) and probably Texas, southern-most parts of the other Gulf states and Arizona.

Adults feed on tree sap, rotting fruit, carrion, and dung, but almost never on flowers (Minno and Minno 1999, Opler et al. 2011). Males perch on foliage in full sun to wait for females (Opler et al. 2011).

Eggs are laid in large groups on bark or the undersides of mature leaves (Israel 1982, Opler and Krizek 1984, Opler et al. 2011). The eggs are stacked in an arrangement that likely affords exposure of the smallest percentage to "surface-parasitizing" parasitoids (Friedlander 1985).

The cryptic young larvae feed gregariously through the third stadium, moving as a group and often passing by numerous leaves before settling at a new feeding site. The larvae follow silk trails that are laid down by other larvae to reach the new feeding areas (Stamp 1984). These feeding migration patterns may serve as a defensive strategy against predators and parasitoids that might use the presence of damaged foliage and/or feces to locate the aggregations of larvae (Stamp 1984). Young larvae molt on the undersides of leaves or in leaf shelters made by tying leaves together with silk (Stamp 1984). Older larvae are solitary.



Figure 15. Newly hatched larvae of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).
Credit: Donald Hall, University of Florida



Figure 16. Two-day-old gregarious larvae of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).
Credit: Donald Hall, University of Florida



Figure 17. Eleven-day-old (third instar) gregarious larvae of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).

Credit: Donald Hall, University of Florida

When threatened, young larvae swing their spiny, shield-like heads and attempt to bite with their mandibles—behavior that may defend against ants and other small predators (Stamp 1984).

Larvae that develop under the short photoperiod conditions of fall turn to brown-colored third instars and overwinter in groups of approximately ten in a hibernaculum constructed by tying leaves together and attaching the leaf petioles to the stem with silk, so the hibernaculum remains on the tree throughout the winter (Cech et al. 2011; Cech and Tudor 2005; Scott 1986; and Stamp 1983). In some hibernacula, a single leaf or part of a leaf is used that dries and curls to form the shelter.



Figure 18. A hibernaculum of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), formed from two leaves. The galls on the hibernaculum were formed by hackberry psyllids.
Credit: Donald Hall, University of Florida



Figure 19. A hibernaculum of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), formed by curling the edge of a single leaf. This small hibernaculum contained five larvae.
Credit: Donald Hall, University of Florida

As the new foliage begins to appear, the larvae come out of hibernation and begin to feed, after which they regain their green color. A few days later they molt to the next instar. For a period, of time they continue to return to the shelter of the hibernaculum after feeding.



Figure 20. Overwintering larvae of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).
Credit: Donald Hall, University of Florida



Figure 21. Post-hibernation larvae of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), on hibernaculum.
Credit: Donald Hall, University of Florida

Fourth and fifth instar larvae are solitary and make leaf shelters for protection when they are not feeding.



Figure 22. Fourth instar larva of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte), in leaf shelter.
Credit: Donald Hall, University of Florida

Hosts

The larval hosts of the tawny emperor are hackberry trees (*Celtis* spp.) in the family Celtidaceae. The two most common hackberries in the eastern United States, the more northern hackberry, *Celtis occidentalis* Linnaeus, and the more southern sugarberry, *Celtis laevigata* Willd., can usually be recognized by the slightly to heavily warty appearance (or pronounced ridges on mature *Celtis occidentalis*) of the bark. A key to *Celtis* species is available at Efloras.org, 2009.



Figure 23. Sugarberry, *Celtis laevigata* Willd., a host of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).
Credit: Donald Hall, University of Florida



Figure 24. Warty trunk of sugarberry, *Celtis laevigata* Willd., a host of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).
Credit: Donald Hall, University of Florida



Figure 25. Heavily warty trunk of sugarberry, *Celtis laevigata* Willd., a host of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).

Credit: Donald Hall, University of Florida



Figure 26. Hackberry, *Celtis occidentalis* L., a host of the tawny emperor, *Asterocampa clyton* (Boisduval & LeConte).

Credit: Donald Hall, University of Florida

Economic Importance

Tawny emperor larvae are rarely sufficiently numerous to seriously affect host trees. However, population outbreaks have been recorded (Israel 1982). Control measures are neither required nor recommended.

Various insect parasitoids of eggs and larvae and general predators aid in regulation of tawny emperor populations (Israel 1982; Stamp 1984).

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