Hickory Horned Devil, or Royal Walnut Moth, *Citheronia regalis* (Lepidoptera: Saturniidae)[1]

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Figs. 1-2. *Citheronia regalis*: 1) adult female, left half (FSCA photo); 2) full grown larva (by H. L. King, 1983) (both approx. life-size).

INTRODUCTION: The royal walnut moth, *Citheronia regalis* (Fabricius), is one of the more colorful of the emperor moths in Florida (Fig. 1), and one of two species in the genus to occur in Florida (Kimball 1965; Heppner 2003). It is a member of the saturniid subfamily Ceratocampinae, the regal or royal moths. The larvae are likewise very colorful, with huge horn-like scoli and spines (Fig. 2), and its ferocious appearance has spawned the common name of hickory horned devil. In Florida, it is also called the "Suwannee dragon." It is fairly common in northern Florida and into central Florida, but one usually only sees the large larvae when they start crawling around to find an underground pupation site in mid-summer and again in late autumn. The adults are nocturnal and usually not seen by the general public. The larvae appear dangerous, with their huge "horns," but have no known stinging setae. When bothered, the larva will rear up and snap its head backwards and around to hit anything touching it, so persons can be hit with the spiny horns this way, and if the larva is held in the hand, one finds it is quite strong when full grown at nearly 6 inches in size.

IDENTIFICATION: Adults are relatively uniform in coloration throughout their range in North America, with purple-brown forewings striped with orange-brown on the edges and along all veins, plus several round or oval yellow spots near the wing termen and basal, and median yellow spots along the radial vein. The hindwings are mostly purple-brown (lighter on costal third). Females are larger than males. Larvae cannot be confused with any other North American emperor moth, becoming nearly 6 inches (or 150 mm) in length when full grown. Larvae usually are green or blue-green (sometimes more brown in early instars), with small black scoli and a black lateral line on the body, plus a white line below the spiracle and a diagonal black mark at each spiracle and several very large black-tipped orange horn-like scoli on the thoracic segments. The head and thoracic legs are orange. Prolegs are green and orange, with a vertical black line laterally bordered by white.

The adult and larva have been illustrated or described many times in various works on Lepidoptera, general entomology, and even in field guides, such as Arnett (1985), Covell (1984), Frost (1959), Holland (1903), and Milne and Milne (1980). Larval descriptions have been given in more detail by Tuskes *et al.* (1996) and Villiard (1975).

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RELATED SPECIES: There are three species of *Citheronia* in North America, with the royal walnut moth having the widest distribution. The related pine devil moth, *Citheronia sepulcralis* Grote & Robinson, has a similar range, but is distributed more east and southeast, not reaching west of the Appalachians and only to southern Louisiana (Brou 1997). The pine devil moth is almost uniformly purple-brown in color, while the larva is similar in color and has only very short black horns. This species feeds only on pines (Heppner 2003; Tuskes *et al*. 1996). The third species, the Sinaloan walnut moth (*Citheronia splendens sinaloensis* Hoffmann), only occurs in extreme southern Arizona and southwestern New Mexico as a straggler from its range in northwestern Mexico (Tuskes *et al*. 1996). The Sinaloan walnut moth is more similar to the royal walnut moth, but with brilliant white wing spots and streaks on the dark brown wing color. The larva of this species is like the pine devil moth, purple-brown with short black horns. Other species in the genus occur in Mexico and into South America.

DISTRIBUTION: The royal walnut moth was originally described from "America borealis" so the exact location is unknown. It may have originated from John Abbot, a collector living in Georgia after 1790, but could have come from New York or Virginia. It is found throughout the southeastern United States and north along the coast to southern New England, then ranging westward to southern Michigan and Illinois, and west to Nebraska, and south to eastern Texas (Ferguson 1971-72; Lemaire 1988; Tuskes *et al*. 1996). The moth's range follows that of its preferred eastern hardwood host plants. In Florida, it occurs everywhere except south of Lake Okeechobee (Kimball 1965; Heppner 2003).

HOST PLANTS: In Florida, preferred hosts include hickory and pecan (*Carya*), walnut and butternut (*Juglans*), sweet gum (*Liquidambar*), persimmon (*Diospyros*), and sumac (*Rhus*). Local populations will prefer some hosts more than others. Other less common hosts include buttonbush (*Cephalanthus*), wax myrtle (*Myrica*), plum (*Prunus*), sourwood (*Oxydendrum*), ash (*Fraxinus*), sycamore (*Platanus*), sassafras (*Sassafras*), and lilac (*Syringa*) (Heppner 2003; Stone 1991; Tuskes *et al*. 1996). Old reports also indicate some damage to wild cotton and commercial cotton (*Gossypium*) (Powell 1891), and some minor feeding on pecan leaves. Among the preferred hosts, persimmon appears to provide the most nourishment for growth in the larvae (Worth *et al*. 1979, 1982).

BIOLOGY: In Florida, royal walnut moth adults are active from January to early June, and September to December, giving two generations per year (only a single brood occurs in northern states). In Louisiana, documented adult capture dates have two main peaks: early May and late July (Brou pers comm.), and this is similar for northern Florida. Eggs are laid singly, or sometimes in a small group of 2-3 eggs, on the host leaves (Tuskes *et al*. 1996). Larval eclosion takes about 6-10 days under optimal conditions, followed by several weeks of larval feeding. Larvae have 5 instars (Villiard 1975). The pupal stage overwinters. Records of a second overwintering for some pupae (up to 24% of a generation) have been reported for the species (Worth 1979). Larvae are up to 150 mm in length and feed in isolation on leaves of the host plants. Larvae seek sheltered niches for pupation in loose soil, where a pupation chamber is constructed underground. Pupae are active when disturbed.

CONTROL: Larvae are not of significant economic importance, but are sometimes found feeding on pecan trees (the reports of feeding on cotton are questionable; they are possibly just nibbling prior to pupation). The larvae can be sprayed with a bacterial spray, or more immediate results can be obtained from application of various pesticides (consult local IFAS extension service for treatment).

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