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A NEW SPECIES OF GALL MIDGE (DIPTERA:  
CECIDOMYIIDAE) FROM SUBTERRANEAN STEM GALLS OF  
*LICANIA MICHAUXII* (CHRYSOBALANACEAE) IN FLORIDA

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ABSTRACT

A new species of gall midge is described from subterranean stem galls on *Licania michauxii* Prance from Florida. The gall former is a new species of *Lopesia* and the first record of this genus in North America. The limits of *Lopesia*, a genus previously recorded only from South America and Africa, are enlarged to accept the new species. The species is described and illustrated. The pupa of this species is unique in Cecidomyiidae for its large, robust, dorsal abdominal spines that may be used in pushing through sandy soil after leaving the gall.

Key Words: Gall midge, Nearctic Region, new species, gopher apple

RESUMEN

Una nueva especie de mosca gallícola es descrita de agallas subterráneas de *Licania michauxii* Prance en la Florida. El insecto que produce la agalla es una nueva es-

pecie de *Lopesia* y representa el primer registro de este género en América del Norte. Los límites de *Lopesia*, un género previamente registrado sólo de América del Sur y África, han sido ampliados para acomodar la nueva especie. La especie es descrita e ilustrada. La pupa de esta especie es única en la familia Cecidomyiidae por las espinas grandes y robustas del dorso del abdomen que deben ser usadas para empujar a través del suelo arenoso después de dejar la agalla.

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*Licania michauxii* Prance, or gopher apple, is a low shrub that grows to 3-4 decimeters high and spreads partly by means of long, horizontal, subterranean stems that grow 1-10 centimeters below the soil surface (Bell & Taylor 1982, Taylor 1992). The plant belongs to the family Chrysobalanaceae, a chiefly Neotropical family related to Rosaceae. This plant is found throughout most of Florida and on the coastal plains to Mississippi and the Carolinas. The fruit, 2-3 cm long, is made up of a large seed surrounded by white, juicy pulp. It is favored by wildlife, including tortoises, thus the common name, gopher apple, after the Florida gopher tortoise.

In this paper we report for the first time the occurrence of galls on the subterranean stems of *L. michauxii* in Florida and that these woody, spherical outgrowths are formed by the larvae of a new species of gall midge. The cecidomyiid responsible for the gall is a new species of *Lopesia*, a genus heretofore known only from South America and Africa (Gagné 1994).

#### MATERIALS AND METHODS

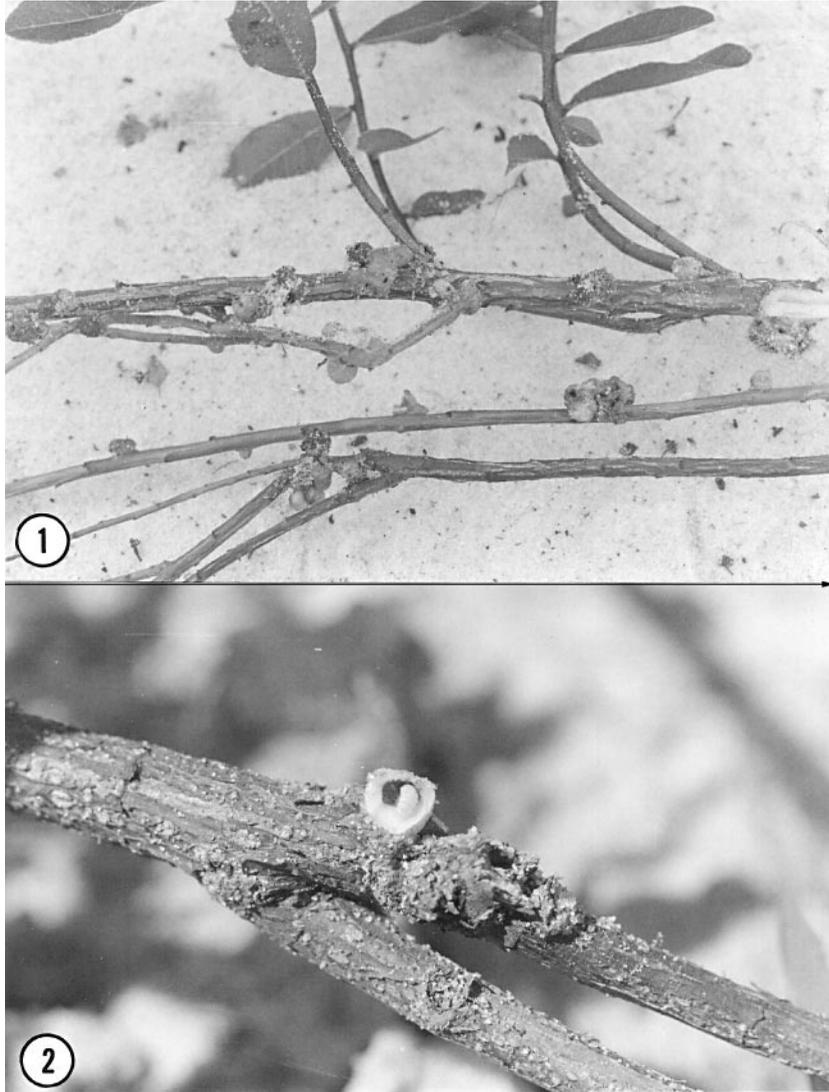
Specimens used for this study were taken from or reared from galls collected from subterranean stems of gopher apple. Adults were reared from galls kept indoors in plastic bags containing some paper towels to absorb excess moisture. Fresh specimens were killed and preserved in 70% ethanol. Specimens were slide mounted for identification and scientific study using the method outlined in Gagné (1989, 1994). Terminology for adult morphology follows usage in McAlpine et al. (1981); that for larval morphology follows Gagné (1989). The new species is to be credited to Gagné.

#### *Lopesia licaniae* Gagné, new species

Adult.—Head (Fig. 6): Eyes about 9 facets long at vertex, connate; facets circular, closely adjacent. Vertex of occiput with wide, dorsal protuberance bearing several long setae. Frons with 2-5 setae per side. Labella short, acutely triangular in frontal view, each with several lateral setae. Palpus 4 segmented. Antenna with 12 flagellomeres. Male flagellomeres (Fig. 7): each with three circumfila, their loops not attaining the following circumfilum; the distal node of each flagellomere constricted near middle. Female flagellomeres (Fig. 8): becoming successively shorter in length from base to apex; last flagellomere with narrow apical elongation; necks setulose.

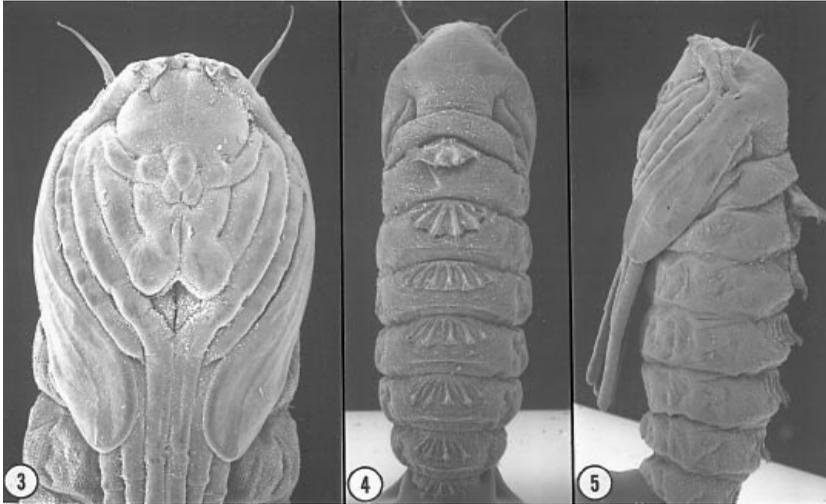
Thorax: Mesanepisternum with 5-12 scales dorsally. Mesepimeron with 8-13 setae. Wing (Fig. 10) length: ♂, 2.4-2.7 mm (n=5); ♀, 2.4-3.1 mm (n=3); R<sub>5</sub> curved apically, joining C posterior to wing apex; Rs weak, oblique, situated slightly distad of mid distance between arculus and R<sub>1</sub> apex; M<sub>3+4</sub> present as a fold. Tarsal claws (Fig. 9) bent near basal third, without teeth; empodia not reaching bend in claws.

Male abdomen: First through sixth tergites entire, rectangular, with mostly single, continuous, posterior row of setae, several lateral setae on each side near midlength, scales covering most of sclerites, and pair of trichoid sensilla on anterior margin. Sev-



Figs. 1-2. Galls on uncovered subterranean branches of *Licania michauxii*. 1) Galls on several branches. 2) Gall cut open to reveal larva.

enth tergite unsclerotized posteriorly, with 1-2 lateral setae, scattered scales, and anterior pair of trichoid sensilla. Eighth tergite sclerotized only anteriorly, with scattered scales and anterior pair of trichoid sensilla. Genitalia (Fig. 11): Cerci broadly rounded, with several posterior setae. Hypoproct divided caudally into 2 long, narrow lobes, each with several setae. Aedeagus as long as splayed gonocoxite, gradually tapered to narrowly rounded apex. Gonocoxite strongly bowed at midlength,



Figs. 3-5. Pupa of *Licania michauxii*. 3) Anterior half only, ventral. 4) Dorsal. 5) Lateral.

with right-angled mesobasal lobe. Gonostylus elongate, cylindrical, barely tapered from base to apex, setulose on basal fourth, asetulose and ridged beyond.

Female abdomen (Figs. 12-13): First through seventh tergites as for male first through sixth. Eighth tergite shorter, with scattered setae and anterior pair of trichoid sensilla. Ninth sternum evenly covered with setae. Tenth tergum without setae. Ovipositor abruptly tapered, barely protrusible; cerci elongate-ovoid, completely setulose and covered with setae, with several long, posteroventral, thick walled, sensory setae; hypoproct elongate, undivided.

Pupa.—(Figs. 3-5) Antennal bases flattened apicoventrally to form a horizontal ridge. Cephalic sclerite with short, inconspicuous seta set on each of two lateral convexities. Face smooth, without horns. Prothoracic spiracles elongate, tapering gradually from base to apex. Abdominal second to eighth tergites with prominent, pigmented anterodorsal spines.

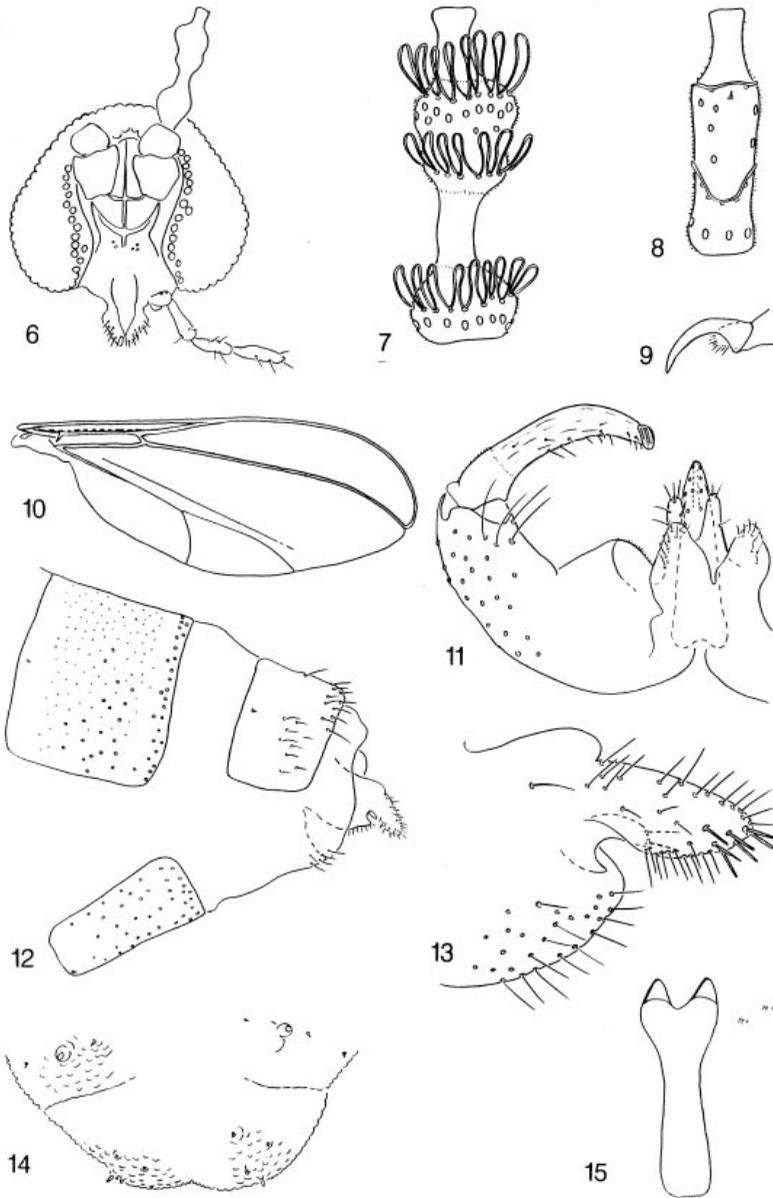
Larva.—Third instar: Integument rugose. Antenna less than twice as long as wide. Spatula (Fig. 15) robust, with two triangular lobes anteriorly. Full complement of papillae basic for supertribe present (Gagné 1989); terminal segment (Fig. 14) with 8 short, setose papillae; setae of one pair thin and pointed, about 3 times as long as wide, setae of remaining pairs as wide as long, obtuse.

Holotype.—♂, from *Licania michauxii*, Indrio, St. Lucie Co., Florida, 6-VII-1983, K. L. Hibbard; deposited in the Florida State Collection of Arthropods, Gainesville.

Paratypes (all from *Licania michauxii*).—2♂, 2♀, 3 pupal exuviae, and larva, same data as holotype; Ft. Pierce, St. Lucie Co., Florida, 18-II-1987, K.L. Hibbard; 2♂♂, 1♀, and 5 larvae, Melbourne, Brevard Co., Florida, USA, 4-IX-1986, F. Smith and K.L. Hibbard. One male, 1 female, and 2 pupal paratypes will be deposited in the Florida State Collection of Arthropods, the remainder in the National Collection of Insects, Washington, D.C.

Etymology.—The name *licaniae* is the genitive of the host genus.

Remarks on taxonomy.—This species is placed in *Lopesia* because it has the following characters: the  $R_5$  wing vein is closer to the end of  $R_1$  than to the arculus; tarsal



Figs. 6-15 *Licania michauxii*. 6) Head. 7) Male third antennal flagellomere. 8) Female third antennal flagellomere. 9) Tarsal claw and empodium. 10) Wing. 11) Male genitalia (dorsal). 12) Female postabdomen (lateral). 13) Detail of female tenth segment and cerci (lateral). 14) Eighth and terminal larval segments. 15) Larval spatula and lateral papillae of one side.

claws are bowed near the basal third and the empodia do not quite reach the bend in the claws; male antennal circumfila have short loops that do not reach the bases of the next distal circumfilum; male gonocoxites are bowed at midlength; the ovipositor is barely protrusible and its cerci have several apicoventral, thin-walled setae that are not shorter than surrounding setae; and larval terminal papillae have short, more or less corniform setae (Gagné & Marohasy 1993, Gagné 1994). This species differs from other known *Lopesia* in having simple instead of toothed tarsal claws. Several genera of Cecidomyiinae have representatives with toothed or simple tarsal claws, so it appears the tooth is easily lost. This species is the first cecidomyiid known to feed on Chrysobalanaceae, a chiefly Neotropical family. Four other species of *Lopesia* are known: *Lopesia brasiliensis* Rübisaamen from a Melastomataceae in Brazil; *L. parinararii* Tavares from a Rosaceae in Mozambique; and *L. armata* Gagné and *L. niloticæ* Gagné from Mimosaceae in Kenya (Gagné & Marohasy 1993). Several other, undescribed species from the Neotropical Region are represented in the USNM, which indicates to us that the diversity and host range of this genus will not be appreciated until the Neotropical fauna is better studied. In the key to Neotropical genera in Gagné (1994), the new species will not key to *Lopesia* because of the absence of teeth on the tarsal claws.

Pupae of many plant-feeding Cecidomyiidae have prominent dorsal abdominal spines that are used by the pupa when pushing through plant tissue to the exterior (RJG, personal observation), but we know of no other species that has such prominent spines or, in the case of the spines of the second abdominal segment, where they are placed almost perpendicular to the body axis. The size and shape of the spines may be adaptations for pushing through the several centimeters of soil between the galls on the subterranean branches and the soil surface.

Biological observations.—Woody, spheroidal outgrowths can be found on the subterranean stems (Figs. 1-2). These are 3-4 mm in diam and sometimes occur in large aggregates up to 1 cm in diam. Galls with the gallmaker inside are an off-white color. Old galls are a dark brown and usually have an exit hole. Fresh galls were present in the summer, fall, and winter months. A single cecidomyiid larva is found inside each gall. The full-grown larva is curled into a u-shape and completely fills the cavity (Fig. 2). Pupation occurs in the gall. When the adult is fully formed inside the pupa, the pupa breaks through the gall and crawls through the soil to the surface. A break in the pupal thorax then develops through which the adult escapes.

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