

A NEW SPECIES OF *CIRROSPILUS* (HYMENOPTERA:  
EULOPHIDAE) AND TWO NEW SYNONYMIES OF  
PARASITOIDS REARED FROM THE CITRUS LEAFMINER,  
*PHYLLOCNISTIS CITRELLA* (LEPIDOPTERA:  
GRACILLARIIDAE)

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ABSTRACT

*Cirrospilus floridensis*, reared from the citrus leafminer, *Phyllocnistis citrella* Staintain, is described and illustrated. *Zagrammosoma zebra-lineatum* De Santis and *Pnigalio flavipes* (Ashmead) are synonymized with *Zagrammosoma multilineatum* (Ashmead) and *Pnigalio minio* (Walker), respectively.

Key Words: citrus, leafminer, eulophid, biological control, taxonomy

RESUMEN

Se describe e ilustra una nueva especie, *Cirrospilus floridensis*, criada a partir del minador de los cítricos, *Phyllocnistis citrella* Staintain. Se propone la sinonimia de *Zagrammosoma zebra-lineatum* De Santis con *Zagrammosoma multilineatum* (Ashmead) y de *Pnigalio flavipes* con (Ashmead) *Pnigalio minio* (Walker).

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The citrus leafminer, *Phyllocnistis citrella* Staintain, was described from India in 1856. Prior to 1993, this pest was only known from the citrus growing regions of East Asia, Indonesia, Australia, and East Africa (Heppner, 1993). *P. citrella* was discovered in Homestead, Florida in 1993 and quickly spread throughout the citrus growing regions of Florida, Texas and Alabama, the Caribbean, Central America, and Mexico. It has also been reported throughout the Mediterranean Basin, South Africa and parts of coastal west Africa (Heppner 1995; Schauff et al. 1998).

Concern over the threat that this species poses to the Florida citrus industry led to a survey that began in 1994 to determine the native parasitoids that attack citrus leafminer in Florida (Browning and Pena, 1995). During the course of the study, a new parasitoid species was discovered and three new synonymies for other parasitoids of the citrus leafminer were established. One of the synonymies established, *Cirrospilus quadrastratus* (Subba Rao and Ramamani) with *Cirrospilus ingenuus* Gahan, was reported by Ujiya and Adachi (1995); Hoy and Nguyen (1997); and Schauff et al. (1998).

The following acronyms are used for the institutions where specimens are deposited.

- BMNH The Natural History Museum, London, England.  
FSCA Florida State Collection of Arthropods, Gainesville, Florida, USA.  
UNLP Universidad Nacional de La Plata, La Plata, Argentina.  
USNM United States National Museum, Washington, DC, USA

*Cirrospilus floridensis* Evans, new species  
(Figs. 1-5)

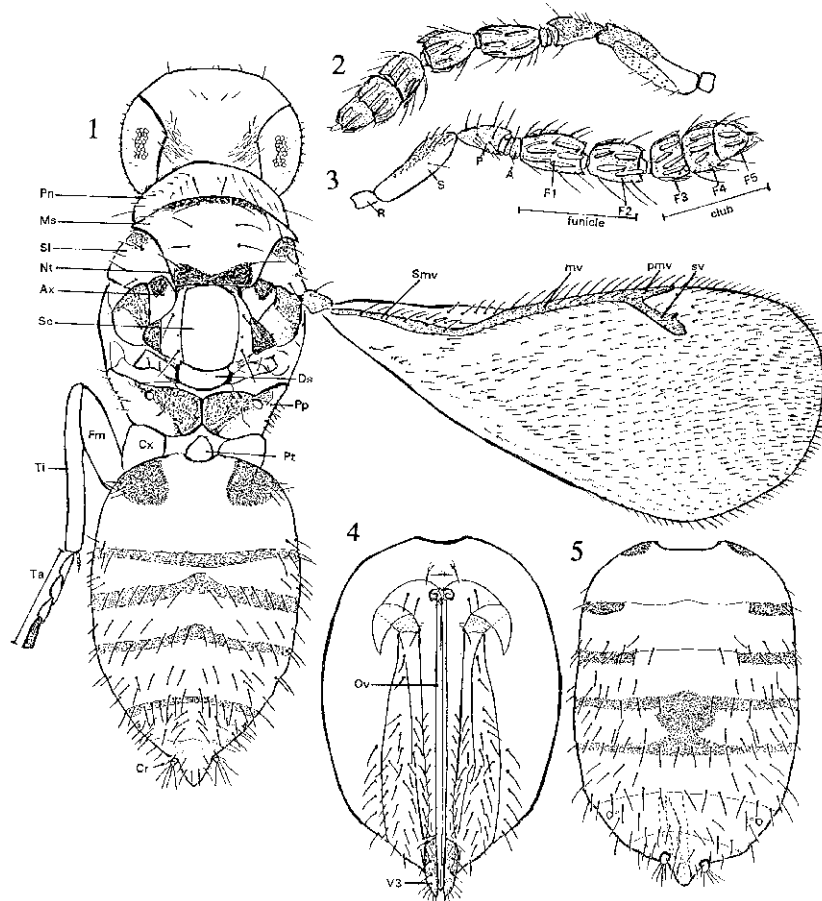
## Description

Female holotype: *Coloration* (Fig. 1). Fore wing hyaline; body yellow to yellow-orange with the following areas dark brown: central portion of scape, proximal three-quarters of pedicel, flagellum, compound eyes, base of occiput, 2 diagonal lines on the pronotum, transverse band on anterior and posterior margins of mesoscutum, notaular sutures, apical spot on axillae, axillulae, 2 longitudinal submedial scutellar grooves, central region of propodeum, apical tarsal segments, valvulae III, base of ovipositor, lateral margins of basal tergite and 4-5 transverse bands on metasomal dorsum; scutellum of some individuals with a round, dark brown, central spot. *Structure*. Body length: 1.7 mm. **Head**: as wide as mesosoma, malar space 0.6× eye height; OOL 0.4× POL; mandible with 2 large and 4 small teeth; face imbricate. Antennae (Fig. 3) inserted slightly below lower ocular line. **Mesosoma**: Pronotum imbricate; midlobe of mesoscutum length 1.1× width with sharp anterior lateral margins and 6 pairs of pale setae (Fig. 1), and shallow hexagonal reticulation; axillae advanced and weakly imbricate; side lobe rounded with 2 large setae and 5-6 short setae; scutellum surface somewhat flattened, length 1.2× width with two submedian longitudinal grooves highlighted with dark pigmentation; placoid sensillae small and round, located about halfway between anterior (Sc1) and posterior (Sc2) pairs of scutellar setae, Sc1 0.6× Sc2 length; dorsellum smooth and semicircular; propodeum short and relatively smooth except for prominent medial carina and a few short secondary carinae along the anterior and posterior margins; lateral margin of callus each with approximately 9 long setae; coxae III with shallow imbricate sculpturing, tibial spur of middle leg 1.7× corresponding basitarsus. **Fore wing**: length 2.4× its maximum width; submarginal vein length 0.4× length of marginal vein with 5 very long and stout setae; marginal vein with approximately 12 long setae along the anterior margin; stigmal vein elongate, 2.0× length of marginal vein; postmarginal vein 0.8× length of stigmal vein with 3 stout setae along its anterior margin; costal cell with approximately 15 setae; basal cell with 5-6 setae, speculum broad and closed posteriorly; cubitus slightly curved; discal hairs dense; marginal fringe short, less than 0.1× maximum width of fore wing. **Gaster**: length 1.5× width; ovipositor arising at base of tergite II; valvulae III length 0.2× valvular II length, with numerous elongate setae.

## Male

Similar to female in size, structure and coloration, except sensory organ present on scape (Fig. 2) and transverse bands on gastral tergites II and III broken centrally (Fig. 5).

Morphological variation: Females of *C. floridensis* vary primarily in the degree of coloration of the mesosoma. A dark brown, longitudinal line or oval mark is sometimes present on the mesoscutum and scutellum, and the size of the darkened area of the propodeum may vary usually covering only a small central area but sometimes covering almost the entire propodeum except for the lateral margins. Specimens of an unidentified *Cirrospilus* reared in the Dominican Republic, Bahamas, and Honduras are nearly identical to *C. floridensis* in color and structure, but differ in having the axillae completely yellow and the first pair of scutellar setae very short, similar to those of *C. elegantissimus* Westwood, a European species. Whether these specimens represent a distinct species, or a variation of *C. floridensis*, is not known at this time.



Figs. 1-5. *Cirrospilus floridensis*—(1,2,4) holotype female; (3,5) male: 1) habitus 2) antenna 3) antenna 4) gaster venter 5) gaster dorsum. Terms: anelli (A), axilla (Ax), cerci (Cr), coxa (Cx), dorsellum (Ds), funicle (F), femur (Fm), mesoscutum (Ms), marginal vein (mv), notaulus (Nt), ovipositor (Ov), pedicel (P), postmarginal vein (pmv), pronotum (Pn), propodeum (Pp), petiole (Pt), radicle (R), scape (S), scutellum (Sc), side lobe (Sl), submarginal vein (smv), stigmal vein (sv), tibia (Ti), tarsus (Ta), valvulae III (V3).

#### Comments

*Cirrospilus floridensis* Evans can be distinguished from other *Cirrospilus* species by the dark transverse band along the posterior margin of the midlobe. It is most similar to *Cirrospilus marilandica* (Girault) and can be distinguished by its shorter postmarginal vein which is less than or subequal to the stigmal vein and by the dark brown bands along the scutellar grooves. In *C. marilandica*, the postmarginal vein is clearly longer than the stigmal vein and the scutellum is entirely yellowish-orange.

Boucek (1988) separated the genus *Cirrospilus* into five groups of species. *Cirrospilus floridensis* is placed in the *Cirrospilus* s. str. (= *Pseudiglyphomyia*) group based upon the propodeum that is at least 1.5× as long as the dorsellum with a distinct median carina connecting the equally carinate anterior and posterior margins.

#### Specimens Examined

Holotype female (USNM), U.S.A, Florida, Dade County, Homestead, II 1995, R. Duncan, reared from *Phyllocnistis citrella* Staintain (Lepidoptera: Gracillariidae) on *Citrus* sp. Paratypes (BMNH, FSCA, USNM): 5 females and 5 males, same collection data as holotype. Other specimens (FSCA): 4 females, Florida, Dade Co., reared from *Phyllocnistis* sp. on mahogany (*Swietenia macrophylla* King).

#### Etymology

This species is named for the state of Florida.

#### *Pnigalio minio* (Walker)

*Eulophus minio* Walker 1847:25; Holotype female, USA: Florida, St. John's Bluff (BMNH).

*Pnigalio minio* (Walker): Peck 1951: 426.

*Elachistus proximus* Ashmead 1894: 340.

*Pnigalio proximus* (Ashmead): Burks 1975: 145 (USNM, examined).

*Sympiesis flavipes* Ashmead 1886: 133; Holotype female, USA: Florida, Jacksonville, (USNM Type No. 41330, examined). NEW SYNONYMY. For complete synonymy of this species see Miller (1970).

Walker (1847) described *P. minio* from a specimen collected at St. John's Bluff, located on the northeast outskirts of Jacksonville, Florida. This is the area from which the holotype of *Sympiesis* (= *Pnigalio*) *flavipes* Ashmead was collected. I examined the holotype of *Pnigalio flavipes* and that of *Pnigalio proximus* (Ashmead). These species are very similar in coloration, relative length of antennal segments, and the shape, venation and ciliation of the fore wing, but differ primarily by the degree of sculpturing of the mesosoma. In *P. flavipes*, the mesoscutum, scutellum and dorsellum are coarsely sculptured, the axillae are alutaceous, the propodeum has a secondary costula and paramedial carinae are present in the inner quadrant areas. In *P. proximus*, the sculpturing of the mesoscutum and scutellum is more shallow, the axillae and dorsellum are smooth, or nearly so, the propodeum has one costula and the inner quadrant areas are smooth.

Barrett et al. (1988) reported that *P. flavipes* individuals varied in color and propodeal sculpturing over the species geographic range. Smaller individuals, particularly the males, tend to have weaker sculpturing, the propodeum may lack the costula, and the antennal segments are often shorter than those of larger specimens. *Pnigalio proximus* individuals are generally smaller (0.9-2.0 mm) than *P. flavipes* (1.8-2.7 mm) individuals (Miller, 1970). However, differences in body size may occur among individuals of the same species reared from different hosts and under different environmental conditions. I consider the morphological differences that have been used to distinguish *P. minio* from *P. flavipes* to represent intraspecific variation, and propose that the two species be synonymized. This species, by far, is the most prevalent parasitoid reared from the citrus leafminer in Florida.

*Zagrammosoma multilineatum* (Ashmead)

*Hippocephalus multilineatus* Ashmead 1888: 8; Female holotype, USA: Kansas, Riley Co. (USNM, examined), name preoccupied by *Hippocephalus* Swainson 1839, in fishes.

*Zagrammosoma zebralineatum* De Santis 1983: 9; Holotype female, COLOMBIA, Pradera, 1982, E. Flores, ex. *Leucoptera coffeella*. (UNLP, examined) NEW SYNONYMY.

I examined the holotypes of *Zagrammosoma zebralineatum* De Santis and *Zagrammosoma multilineatum* (Ashmead). The two specimens are nearly identical in body shape and coloration, but differ in that the gaster of *Z. zebralineatum* is slightly more elongate and has a slightly different banding pattern than that of *Z. multilineatum*. I consider these differences to represent intraspecific variation, evidenced by the fact that the gaster of specimens reared from *P. citrella* from *Phyllocnistis citrella* in the Bahamas were similar to *Z. multilineatum* in the shape (less elongate) but identical in body coloration to *Z. zebralineatum*. Similar variation in the coloration of the gaster of *Z. multilineatum* has been observed in individuals reared from *P. citrella* on citrus in Florida.

*Cirrospilus ingenuus* Gahan

*Cirrospilus ingenuus* Gahan 1932: 753, Holotype female, JAVA: Bogor (=Buitenzorg), Java, ex. *Phyllocnistis citrella*, A. Vough, (USNM Type No. 43924, examined).

*Scotolinx quadristriata* Subba Rao and Ramamani 1965:412.

*Cirrospilus quadristriatus* (Subba Rao and Ramanani).

*Cirrospilus ingenuus* Gahan: Ujike and Adachi 1995: 96.

The synonymy of *Cirrospilus ingenuus* Gahan with *Cirrospilus quadristriatus* (Subba Rao and Ramamani) was established during the course of this study and confirmed by J. LaSalle and Z. Boucek (BMNH). The original description of *C. ingenuus* does not mention the four dark, transverse bands on the dorsum of the gaster, which may have led to some confusion regarding its identity. The synonymy was first reported by Ujike and Adachi (1995), and later by Hoy and Nguyen (1997) and Schauff *et al.* (1998).

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