

PEST ALERT

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Adam H. Putnam, Commissioner of Agriculture

Bondar's Nesting Whitefly, *Paraleyrodes bondari*, a Whitefly (Hemiptera: Aleyrodidae) New to Florida Attacking Ficus and Other Hosts.

Ian C. Stocks, ian.stocks@freshfromflorida.com, Biological Scientist IV, Florida Department of Agriculture and Consumer Services, Division of Plant Industry

INTRODUCTION: In December, 2011, Lee County Extension Director Stephen Brown (University of Florida Institute of Food and Agricultural Sciences) collected whiteflies from a ficus hedge in Lee County that was covered heavily in white wax and black sooty mold. The whitefly was identified as *Paraleyrodes bondari* Peracchi, and verified by Dr. Greg Evans at the USDA - Systematic Entomology Laboratory, and Dr. Jon Martin, British Museum of Natural History. After clarifying the status of published reports that this species was known from Florida and California, it was determined that this species was a new UNITED STATES CONTINENTAL RECORD. This whitefly is native to Brazil, but has been introduced into numerous locations around the world, including Hawaii around 2003 (Walter Nagamine, Hawaii Department of Agriculture, personal communication.). *Paraleyrodes bondari* (Bondar's nesting whitefly) is one of 17 species in the genus *Paraleyrodes* that occur throughout the Neotropics. Species in this genus have been given the common name "nesting whiteflies" after the characteristic pattern of wax that forms on the leaf surface around the pupa.

Three other species in this genus are known from Florida: *P. minei* Iaccarino, *P. pseudonaranja* Martin and *P. persea* (Quaintance), with none being common or found in high numbers. Based on literature reports, *Paraleyrodes* species may have many suitable host plant species.

DESCRIPTION: The pupae of *Paraleyrodes* species are essentially undistinguishable in a field setting, and are also very similar when viewing slide - mounted specimens. Variation amongst species in the production and pattern of wax on the dorsum of the pupa, may be of some use for field identification, but variation of certain microscopic characters can within species, which has been noted but not quantified, conspires to complicate pupal identification.

Like all aleurodicine whiteflies, the dorsum of the pupa possesses large compound pores aligned along the submargin (Fig. 1). Also, the vasiform orifice and lingula are well developed, but do not display the inter-specific variation seen in the related genus *Aleurodicus* that is useful in species identification. Variation in the size and internal morphology of the compound pores is notable in the species of *Paraleyrodes*, and is useful in provisional species identification when adult males are not present. Other than *Aleurodicus*, *Metaleurodicus* is the only other genus of whiteflies commonly encountered with which *Paraleyrodes* is likely to be confused (Fig. 2). In the field, the pupae of *Metaleurodicus cardini*, or Cardin's whitefly, which is common on guava, resemble *Paraleyrodes* species, but if adults of Cardin's whitefly are present, the distinctive spot on the wing immediately identifies them (Fig. 3).

Paraleyrodes species are smaller than the related *Aleurodicus* species, with mature pupae ca. 1mm long. Pupae are oval and colored a translucent yellowish hue. Most of the samples seen to date exhibit the following: the lateral margin is fringed with a narrow band of clear wax containing an interrupted row of short wax filaments. The most conspicuous character are the dorsally projecting pencils of white shiny wax that may be more than 1mm long. One pair is present anteriorly (the head region), and four pairs posteriorly; two smaller pairs near the middle of the body are present but may not be evident under a hand lens. The nest pattern seems to develop as the wax pencils break and adhere to the leaf, resulting in an irregular layer of fiberglass-like strands. Variation amongst species in the extent of wax development of wax pattern may eventually be useful for field identification, but not enough comparative material has been examined to date to indicate useful differences. Adults also measure ca. 1mm long, and have a dull yellow body with white wings. Two oblique grey bands occur on each forewing, and converge toward the midline such that it appears to form an "X"-pattern with the center of the "X" missing (Fig. 4). The genus *Paraleyrodes* differs from almost all other whiteflies in that species descriptions are based on the morphology of the reproductive structures of adult males, and not the pupal stage (Fig. 5).

BIOLOGY: In general, the biology and life history of *Paraleyrodes* species are unknown. Because *Paraleyrodes minei* has also been collected on *Ficus* species and because *P. minei* cannot be differentiated from *P. bondari* in the field, each find requires slide mounting to verify which species is involved.

HOSTS:

From the literature:

Annonaceae: *Annona squamosa* L.

Arecaceae: *Cocos nucifera* L., *Chamaedorea* sp.

Lauraceae: *Persea americana* MILL., *Ocotea foetens* (AITON) BAILL., *Apollonias barbujana* (CAV.) A. BRAUN

Meliaceae: *Trichilia* (?) sp.

Malvaceae: *Hibiscus rosa-sinensis* L.

Myrtaceae: *Eugenia uniflora* L.

Rutaceae: *Citrus* spp.

From DPI database (Confirmed host, based on the presence of adult males)

Moraceae: *Ficus benghalensis* L.; *Ficus benjamina* L.; *Ficus microcarpa* L. F.

Myrtaceae: *Psidium guajava* L.

Additional hosts for which we have pupae that are referable to *P. bondari*: *Annona* sp. (Annonaceae) and *Pouteria sapota* (Jacq.) H.E. Moore & Stearn (Sapotaceae).

ECONOMIC IMPORTANCE: There are no records in the literature that any *Paraleyrodes* species build populations to economic levels. Although present in Hawaii for at least 6 years, the populations appear to be sporadically distributed and remain at low levels. Agriculture officials in Hawaii have been monitoring this species, and have noted that small infestations are quickly suppressed by *Encarsia variegata* Howard (Aphelinidae) (Walter Nagamine, personal communication).

Observations by FDACS-DPI inspectors in several regions of South Florida indicate that Bondar's nesting whitefly is sporadically present at high levels on *Ficus benjamina* plants. Infested leaves eventually develop a coating of black sooty mold, and strands of white wax accumulate as the pupae mature. Both the upper and lower surfaces of the leaf can be infested, which is unusual for whiteflies (Figs 6-7).

DISTRIBUTION:

Neotropical—Belize, Brazil, Honduras, Venezuela, Puerto Rico. The Puerto Rico (Mayaguez) record, slides of which are in DPI slide collection, is from 1990, on *Citrus sinensis* and contains adult males.

Palaearctic—Madeira

Malagasian—Comoros, Mauritius, Reunion

Oriental—Taiwan

Pacific—Hawaii

Florida—Miami-Dade Co., Broward Co., Palm Beach Co., Lee Co., Collier Co.

NATURAL ENEMIES: No predators or parasitoids are recorded for this species in the literature, but other *Paraleyrodes* species are prey for various Coccinellidae (Coleoptera) and Chrysopidae (Neuroptera) and several Aphelinidae wasps (Hymenoptera) parasitize *Paraleyrodes* species. At least one population of *P. bondari* in S. Florida was parasitized, but identification of the wasp is pending.

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Figure 1. Mature pupa of *P. bondari* on Ficus leaf.
Photography credit: Ian C. Stocks (DPI)



Figure 2. Mature pupa of *M. cardini* on guava leaf.
Photography credit: Ian C. Stocks (DPI)



Figure 3. Adults of *M. cardini* on guava leaf.
Photography credit: Ian C. Stocks (DPI)



Figure 4. Adult of *P. bondari* on Ficus.
Photography credit: Lyle Buss (UF-Entomology and Nematology)

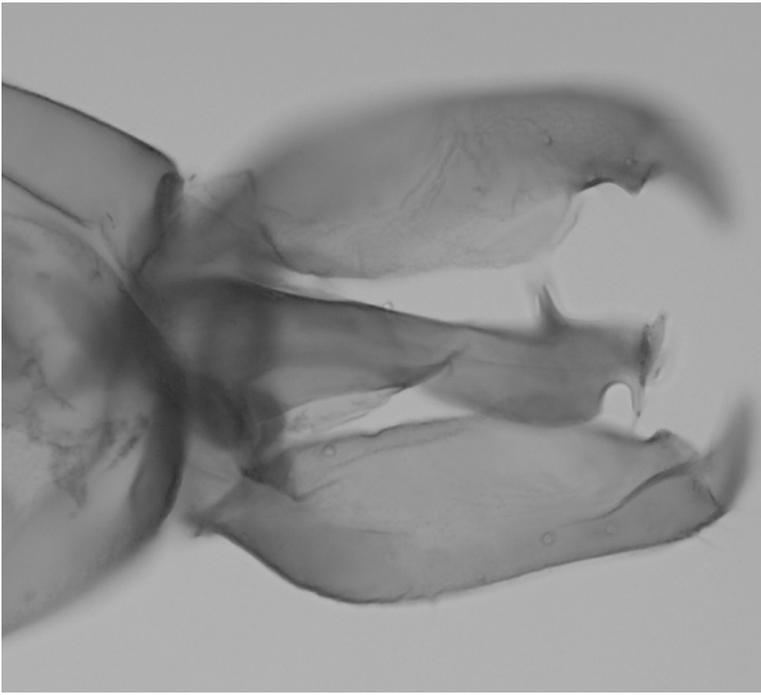


Figure 5. Photomicrograph of male terminalia of *P. bondari*.
Photography credit: Ian C. Stocks (DPI)



Figure 6. Ficus leaves heavily infested with pupae of *P. bondari*.
Photography credit: Stephen Brown (UF-IFAS)



Figure 7. Ficus leaves heavily infested with pupae of *P. bondari*.
Photography credit: Stephen Brown (UF-IFAS)