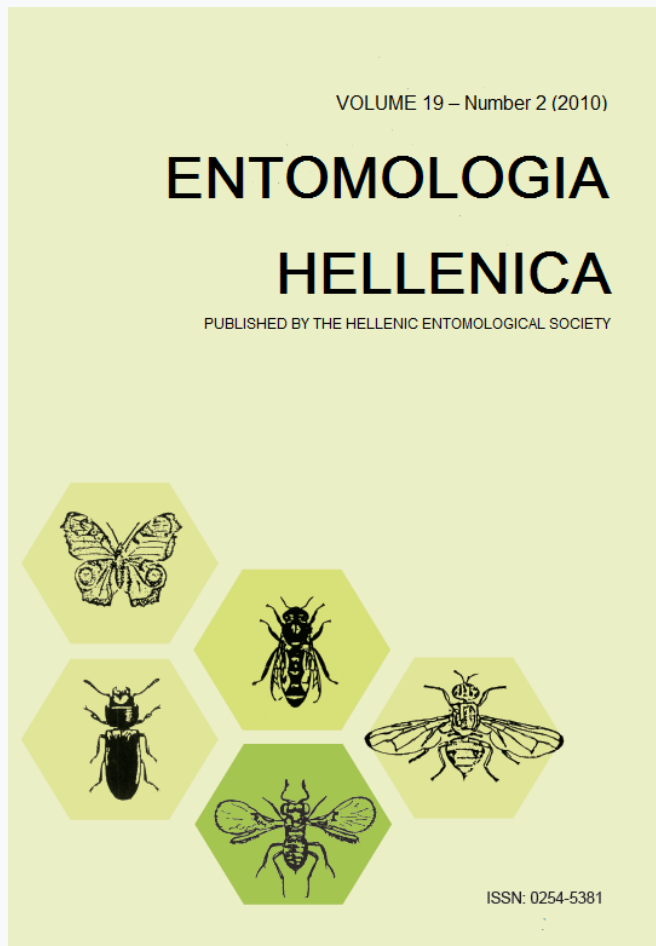


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Annotated list of the scale insects of Guatemala

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ABSTRACT

An annotated checklist of the soft scale insects (Hemiptera: Coccidae) is given for the Central American country of Guatemala. Host and locality data is presented for each species, along with notes on its taxonomic status. The list was developed from study of materials collected in Guatemala by the author and others during the years 1990-2007, and from a review of the literature and records and slide material in the United States National Museum Coccoidea Collection. A study of these materials has increased the number of soft scale insects currently known from Guatemala to 29 species belonging to 23 genera. Guatemala currently ranks second in the number of soft scale insects known from Central American countries below Panama, which has 36 recorded species belonging to 18 genera.

KEYWORDS: Hemiptera, Coccidae, soft scale insects, Guatemala, biodiversity, quarantine interceptions.

Introduction

The soft scale insect fauna of Guatemala is poorly known. Published records are few and are scattered in taxonomic papers by several authors (Wheeler 1913, Alvarado 1935, 1939, Dickson and Fleschner 1955, DeLotto 1971, Gimpel et al. 1974, Gill et al. 1977, Nakahara and Gill 1985, Ben-Dov 1989, 1993, Williams et al. 2005, Kondo et al. 2008). Prior to this study the most complete list of the soft scale insects occurring in Guatemala was from ScaleNet, an online database of the scale insects of the world (Ben-Dov et al. 2010). ScaleNet listed 14 species belonging to 10 genera from Guatemala. Williams (1999) discussed the soft scale insect diversity of Central America, and published a list of 20 genera and 56 species from that neotropical region, with 18 genera and 27

species of those occurring in Guatemala. However, a listing of those taxa was not provided by country. The present author made several trips to Guatemala during the years 1990–2007 to collect and inventory the scale insects from various regions of the country as part of a cooperative project with Dr. Charles MacVean of the Universidad del Valle de Guatemala in Guatemala City. This listing is the first comprehensive list of the soft scale insects of Guatemala to be published and is the result of the study of material collected on these trips.

Materials and Methods

The faunal list is based on a study of slide mounted specimens of material collected in Guatemala by the author and others during the period 1990 – 2007, as well as material

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housed in the United States National Museum Coccoidea Collection (USNM) in Beltsville, Maryland, USA. Additional records were obtained through a review of the scale insect literature and plant quarantine records at the USNM. Slide mounted specimens collected by the author are deposited in the Auburn University Coccoidea Collection at Auburn University in Auburn, Alabama, USA.

Table 1 presents an annotated list of the soft scale insects of Guatemala arranged alphabetically by genus and species. Under each entry are listings of: Hosts, arranged alphabetically by plant family and scientific name, with common names in quotations; Locality, arranged alphabetically by Department (in capital letters) and cities or pu-

eblos (lower case letters), with locality of specimens intercepted by plant quarantine inspectors listed as Guatemala at the point of interception; and Notes, with comments on pertinent literature on the species or comments relating to the taxonomy of the taxa listed.

Results

The following (Table 1) is an annotated listing of the soft scale insects of Guatemala resulting from this study. Included in this listing are 23 genera and 29 named species of soft scale insects. Several species are also listed that are undescribed or unplaced and in need of further study.

TABLE 1. The soft scale insects of Guatemala (Hemiptera: Coccidae).

<i>Akermes</i> sp. near <i>punctata</i> (Cockerell), 1895
Hosts - Not listed.
Locality - Guatemala.
Notes: USNM record. I have been unable to find a slide in the USNM Collection to verify this record. Dr. Takumasa Kondo in Colombia is currently revising this genus and he does not have any specimens from Guatemala in the material he is studying.
<i>Ceroplastes cirripediformis</i> Comstock, 1881
Hosts - Unknown.
Locality - Guatemala.
Notes: Reported in Guatemala by Alvarado (1935, 1939) and Gimpel et al. (1974).
<i>Ceroplastes cistudiformis</i> Cockerell, 1893
Hosts - Rubiaceae: <i>Bouvardia</i> sp.; Rutaceae: <i>Citrus</i> sp.
Locality - SACATEPEQUEZ: Antigua.
Notes: USNM records.
<i>Ceroplastes floridensis</i> Comstock, 1881
Hosts - Araceae: <i>Anthurium</i> sp.; Lauraceae: <i>Persea americana</i> ; Pinaceae: <i>Pinus oocarpae</i> ; Rubiaceae: <i>Cinchona calisaya</i> ; Rutaceae: <i>Citrus</i> sp.
Locality - SUCHITEPEQUEZ: Chicaco, Patulul; Intercepted from Guatemala.
Notes: Also reported in Guatemala by Alvarado (1935, 1939) and Dickson and Fleschner (1955).
<i>Ceroplastes giganteus</i> Dozier, 1931
Hosts - Euphorbiaceae: <i>Jatropha curcas</i> , <i>Euphorbia pulcherrina</i> ; Rubiaceae: <i>Coffea arabica</i> ; Rutaceae: <i>Citrus</i> sp.
Locality - GUATEMALA: Guatemala City.
Notes: Also reported in Guatemala by Alvarado (1939).

TABLE 1 (continued). The soft scale insects of Guatemala (Hemiptera: Coccidae).

Ceroplastes sp.
 Hosts – Moraceae: *Ficus* sp.; Myrtaceae: *Eugenia uniflora*, *Psidium guajava*; Pinaceae: *Pinus oocarpae*.
 Locality – BAJA VERAPAZ: El Chol; GUATEMALA: Amatitlan, Guatemala City; SACATEPEQUEZ: Pastores.
 Notes: I have several lots of material collected in Guatemala that I have been unable to identify to species. Some of these appear to be undescribed species. One may actually be an undescribed genus close to *Ceroplastes*.

Chloropulvinaria floccifera (Westwood), 1870
 Hosts – Lauraceae: *Persea americana*.
 Locality – GUATEMALA: Guatemala City; QUETZALTENANGO: Almolonga.
 Notes: USNM records. Specimens not seen.

Coccus hesperidum Linnaeus, 1758
 Hosts - Aracaceae: *Chamaedorea* sp., *Diffenbachia picta*; Araleaceae: *Schefflera* sp.; Fabaceae: *Dipteryx panamensis*, *Tephrosia* sp.; Salicaceae: *Salix* sp.
 Locality - GUATEMALA: Guatemala City; SAN MARCOS: El Quetzal; ZACAPA: Rio Hondo.
 Notes: A cosmopolitan species that is common in Guatemala and likely more widely distributed than my collection records indicate.

Coccus longulus (Douglas), 1887
 Hosts – Fabaceae: *Cassia* sp.; Malvaceae: *Hibiscus* sp.; Mimosaceae: *Acacia angustissima*; Papilionaceae: *Cajanus cajan*.
 Locality – GUATEMALA: Guatemala City; ZACAPA: Rio Hondo.
 Notes: This is a polyphagous species which does not seem to have a preferred host.

Coccus pseudoheperidum (Cockerell), 1895
 Hosts - Orchidaceae: *Cattleya gaskelliana*, *C. mossiae*, *C. trianne*.
 Locality - Guatemala at Lerado, TX, San Francisco, CA, and Washington, DC.
 Notes: All from USNM records. Also reported in Guatemala by Ben-Dov (1993) and Gill et al. (1977). This species is almost exclusively restricted to orchids.

Coccus viridis (Green), 1889
 Hosts - Musaceae: *Musa* sp.; Rubiaceae: *Cinchona* sp., *Coffea arabica*, *Coffea* sp.; Rutaceae: *Citrus* sp.
 Locality -BAJA VERAPAZ: El Chol; SANTA ROSA: Barbarena; Guatemala at Tiquisate.
 Notes: Also reported in Guatemala by Alvarado (1939).

Cryptostigma sp.
 Hosts - Fabaceae: *Interlobium cyclocarpum*.
 Locality - ESCUINTLA: Escuintla.
 Notes: This is an undescribed species that is currently being described By Takumasa Kondo. There is also a record of this genus from Guatemala at the USNM, but I have been unable to locate any slide material of this genus from Guatemala in the USNM collection.

TABLE 1 (continued). The soft scale insects of Guatemala (Hemiptera: Coccidae).

Eucalymnatus hempeli Costa Lima, 1923
 Hosts – Ruscaceae: *Beucarnia* sp. leaf
 Locality – Guatemala at New Orleans
 Notes: This species was identified from unidentified slide mounted specimens in the USNM Coccoidea Collection. Specimens were intercepted by USDA plant quarantine personnel in New Orleans, LA.

Eucalymnatus tessellatus (Signoret), 1873
 Hosts – Arecaceae: *Sabal* sp.; *Cocos nucifera*.
 Locality – SANTA ROSA: Barbarena
 Notes: A cosmopolitan species that is probably more widely distributed than my collections indicate.

Eucalymnatus sp.
 Hosts – Moraceae: *Ficus* sp. leaf; Polygonaceae: *Cocoloba* sp.?
 Locality – PETEN: Tikal Ruins; Guatemala at Brownsville, TX.
 Notes: I have slide material on hand of two different species that are at present not identified to species, but are different from the two identified species. Further study of these specimens is needed.

Eulecanium sp.?
 Hosts – Moraceae: *Ficus* sp.; Salicaceae: *Olmidiella betschleriana*.
 Locality – CHIMALTENANGO: Mexico; GUATEMALA: Guatemala City.
 Notes: I have slide mounted specimens of two different samples that I am unable to identify. They appear to be undescribed species and are near *Eulecanium*, but do not exactly fit. They may represent undescribed genera.

Kilifia acuminata (Signoret), 1873
 Hosts - Araceae: *Philodendron tripartitum*; Oleaceae: *Jasminum* sp.; Rubiaceae: *Gardenia jasminoides*, *Cinchona* sp.
 Locality – Guatemala at Brownsville, TX, Hoboken, NJ, and Washington, DC.
 Notes: USNM records.

Mesolecanium sp.
 Hosts – “orchid leaf”.
 Locality – Guatemala at Miami, FL.
 Notes: Three records from USNM Plant Quarantine files.

Milviscutulus mangiferae (Green), 1889
 Hosts – Anacardiaceae: *Mangifera indica*; Moraceae: *Artocarpus altilis*.
 Locality – ZACAPA: Rio Hondo; Guatemala at Quirigua.
 Notes: The interception locality is from USNM records.

Octolecanium guatemalensis Kondo, 2005
 Hosts – Mimosaceae: *Inga edulis*.
 Locality – SANTA ROSA: Barbarena.
 Notes: This is a species which is endemic to Guatemala and was described by Kondo et al. (2005).

TABLE 1 (continued). The soft scale insects of Guatemala (Hemiptera: Coccidae).

Parasaissetia nigra (Nietner), 1861
 Hosts – Malvaceae: *Hibiscus sp.* (stem and leaves); Myrtaceae: *Eugenia sp.*; Salicaceae: *Salix sp.*
 Locality – BAJA VERAPAZ: El Chol; GUATEMALA: Guatemala City; SOLOLA: Panajachel.
 Notes: A common cosmopolitan species in the neotropics.

Phalacrocooccus howertoni Hodges & Hodgson, 2010
 Hosts – Euphorbiaceae: *Croton variegatum*, *Croton sp.*
 Locality – ESQUINTLA: Puerto San Jose; SOLOLA: Panajachel; ZACAPA: Rio Hondo.
 Notes: This is a genus and species that was recently described by Hodges and Hodgson (2010) that appears to be invasive in Florida. I first collected this species in Guatemala in 1990 and misidentified it as an undescribed species of *Philephedra*, which it closely resembles.

Philephedra lutea (Cockerell), 1893
 Hosts – Euphorbiaceae: *Codiaeum sp.* leaf.
 Locality – Guatemala at Miami, FL.
 Notes: Reported in Guatemala by Nakahara and Gill (1985).

Philephedra tuberculosa Nakahara & Gill, 1985
 Hosts – Caracaceae: *Carica papaya*; Euphorbiaceae: *Codiaeum sp.* leaf and plant.
 Locality – GUATEMALA: Guatemala City; RETALHULEU: Retalhuleu; Guatemala at Miami, FL.
 Notes: Also reported in Guatemala by Nakahara and Gill (1985).

Prionococcus americanus Williams, Hodgson and Danzig, 2005
 Hosts – Araceae: *Anthurium salvinii*, *Philodendron sp.*; Polygonaceae: *Cocoloba unifera*; unknown leaf.
 Locality – Guatemala at Hoboken, NJ, at Los Angeles, CA, at New Orleans, LA, and at San Francisco, CA.
 Notes: All the records for this species are USDA Plant Quarantine interceptions from Guatemala. I identified slide mounted specimens of this material from the USNM Collection.

Protospulvinaria pyriformis Cockerell, 1894
 Hosts – Araliaceae: *Hedera helix*, *Schefflera sp.*; Rubiaceae: *Gardenia jasminoides*.
 Locality – GUATEMALA: Guatemala City; SACATEPEQUEZ: Antigua.
 Notes: A cosmopolitan species that is common in Guatemala and probably is more widely distributed than my collection records indicate.

Pseudokermes vitreus (Cockerell), 1894
 Hosts – Lauraceae: *Persea americana* var. *steyermarkii*; Malpighiaceae: “chali or chali-ponga”.
 Locality – SOLOLA: Panajachel; Guatemala at Los Angeles, CA
 Notes: This species was recently transferred from *Inglisia* to *Pseudokermes* by Kondo and Hardy (2008).

TABLE 1 (continued). The soft scale insects of Guatemala (Hemiptera: Coccidae).

Pulvinaria psidii Maskell, 1893

Hosts – Araceae: *Philodendron sp.*; Myrtaceae: *Psidium guajava*; Pittosporaceae: *Pittospora tobira*; Rubiaceae: *Coffea arabica*; Salicaceae: *Salix sp.*

Locality – GUATEMALA: Guatemala City, San Juan Sacatepequez; SANTA ROSA: Barbarena; SOLOLA: Panajachel.

Notes: This is the most common species of *Pulvinaria* in Guatemala.

Pulvinaria sp.

Hosts – Epidendroideae: *Lycaste alba*; Moraceae: *Ficus sp.*; Orchidaceae: *Oncidium sp.*; Verbenaceae: *Lantana sp.* leaves.

Locality – ALTA VERAPAZ: Coban; CHIMALTENANGO: Mixco; Guatemala at Los Angeles, CA and Miami, FL.

Notes: I have several collections that I have been unable to place to species, but they are different from the identified species of *Pulvinaria* known from Guatemala. Further study of these specimens is needed.

Saissetia coffeae (Walker), 1852

Hosts – Apocynaceae: *Stephanotis floribunda*; Cycadaceae: *Cycas sp.*; Malvaceae: *Hibiscus sp.*; Rubiaceae: *Coffea arabica*.

Locality – BAJA VERAPAZ: El Chol; GUATEMALA: Guatemala City, Palencia; SANTA ROSA: Pueblo Nuevo Vinas.

Notes: Also reported in Guatemala by Alvarado (1939).

Saissetia neglecta De Lotto, 1969

Hosts – Not reported.

Locality – Guatemala.

Notes: Reported in Guatemala by De Lotto (1971).

Saissetia oleae (Olivier), 1791

Hosts – Unidentified small tree.

Locality – ZACAPA: Rio Hondo.

Notes: Also reported in Guatemala by De Lotto (1971).

Schizochlamidia sp.

Hosts – Mimosaceae: *Acacia angustissima*.

Locality – SOLOLA: Panajachel.

Notes: I have slide mounted specimens of this material I collected in 1990 that appear to be an undescribed species of *Schizochlamidia*.

Tillanococcus mexicanus Ben-Dov, 1989

Hosts – Bromeliaceae: “bromeliads”.

Locality - Guatemala at Brownsville, TX, Miami, FL, and New Orleans, LA.

Notes: Reported in Guatemala by Ben-Dov (1989).

Tillanococcus tillandsiae Ben-Dov, 1989

Hosts - Bromeliaceae: *Tillandsia sp.*, “bromeliads”

Locality - Guatemala at Isreal, New Orleans, LA and JFK Airport, NY.

Notes: Reported in Guatemala by Ben-Dov (1989).

Toumeyella sallei (Signoret), 1874

Hosts - Anacardiaceae: *Spondius sp.*; Fabaceae: *Erythrina corallodendron*, *Erythrina sp.*

Locality – GUATEMALA: Amatitlan, Guatemala City; SOLOLA: San Lucas Toliman.

Notes: USNM records. Specimens not seen. Reported in Guatemala by Wheeler (1913).

TABLE 1 (continued). The soft scale insects of Guatemala (Hemiptera: Coccidae).

Toumeyella sp.
 Hosts - Anacardiaceae: *Spondius purpurea*; Boraginaceae: *Wigandia urens*; Fabaceae: *Diphysa robiniodes*, *Erythrina berteriana*, *Erythrina* sp., *Inga* sp.; Lauraceae: *Persea americana*; Loasaceae: *Chichicastae grandis*; Rubiaceae: *Coffea arabica*; Rutaceae: *Citrus arundifolia*, *C. sinensis*.
 Locality - GUATEMALA: Guatemala City; HUEHUETENANGO: Concepcion; SACATEPEQUEZ: Antigua, San Antonio Aguas Calientes; SOLOLA: San Lucas Toliman; Guatemala at Washington, DC.
 Notes: I have slides of several species of *Toumeyella* I have collected in Guatemala that are apparently new and undescribed, and some that are undetermined to species. Further study is needed on these specimens.

Vinsonia stellifera (Westwood), 1871
 Hosts – Orchidaceae: *Stanhopea* sp.
 Locality – Guatemala at Washington DC.
 Notes: Identified from USNM slide mounted material intercepted by USDA plant quarantine inspectors.

Discussion

Kozar and Ben-Dov (1997) listed 51 genera and 298 species of Coccidae from the Neotropical Region and stated that the scale insect faunas of the neotropics tends to be specialized and rich, with 20 endemic genera and 247 endemic species. They also indicated a pressing need for further collecting throughout the entire Neotropical Region, as almost all records are restricted to a relatively small area of Brazil. With a limited amount of collecting in the field, I have increased the known soft scale insect fauna of Guatemala by over 50% when one considers the undescribed taxa indicated in Table 1. I concur that more collecting is urgently needed before species are lost due to habitat destruction, which is continuing at an alarming rate in the neotropics.

Species which are documented for the first time as occurring in Guatemala include: *Ceroplastes cistudiformis* Cockerell, *Coccus hesperidum* Linnaeus, *Coccus longulus* (Douglas), *Eucalymnatus hempeli* Costa Lima, *Eucalymnatus tessellatus* Signoret, *Milviscu-*

tulus mangiferae (Green), *Phalacrocooccus howertoni* Hodges and Hodgson, *Protospulvinaria pyriformis* Cockerell, and *Vinsonia stellifera* (Westwood). I also estimate that I have at least 5 undescribed species and 2 undescribed genera in the material I have collected and studied.

Among the seven Central American countries, Guatemala, with 29 species belonging to 23 genera of soft scale insects, now ranks second only to Panama, which has 36 species belonging to 18 genera (Williams 1999). It is hoped that this updated listing of the soft scale insects of Guatemala will serve as a basis for further faunistic and taxonomic studies of the scale insects of the neotropics and Central America in particular.

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Κατάλογος κοκκοειδών εντόμων της οικογένειας Coccidae από την Γουατεμάλα

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ΠΕΡΙΛΗΨΗ

Ένας λεπτομερής κατάλογος των ειδών της οικογένειας Coccidae παρουσιάζεται για μια χώρα της κεντρικής Αμερικής, τη Γουατεμάλα. Το φυτό ξενιστής και η τοποθεσία παρουσιάζεται για κάθε είδος μαζί με παρατηρήσεις για την ταξινομική του κατάσταση. Ο κατάλογος αναπτύχθηκε από μελέτες που πραγματοποίησε ο συγγραφέας στη Γουατεμάλα καθώς και από υλικό που συλλέχθηκε από άλλους επιστήμονες την περίοδο 1990-2007, καθώς επίσης και από την ανασκόπηση της βιβλιογραφίας και καταγραφές που βρίσκονται στις ΗΠΑ, στη συλλογή του Εθνικού Μουσείου Κοκκοειδών. Η μελέτη του παραπάνω υλικού οδήγησε στην αύξηση του αριθμού των ειδών της οικογένειας Coccidae από την Γουατεμάλα σε 29 είδη που ανήκουν σε 23 γένη. Η Γουατεμάλα πλέον κατατάσσεται ως δεύτερη σε αριθμό ειδών της οικογένειας Coccidae μεταξύ των χωρών της κεντρικής Αμερικής, μετά από τον Παναμά όπου έχουν καταγραφεί 36 είδη που ανήκουν σε 18 γένη.