RESEARCH ARTICLES

AN UPDATED CHECKLIST OF SCALE INSECTS (HEMIPTERA: COCCOIDEA) OF THE GALAPAGOS ISLANDS, ECUADOR

By: Piedad Lincango[1,2], Christopher Hodgson[3], Charlotte Causton[1] & Douglass Miller[4]

[1]Charles Darwin Research Station, Galapagos Islands, Ecuador
[2]Present address: Universidad de Valencia, Instituto Cavanilles de Biodiversidad y Biología Evolutiva, Apartado 22085, 46071 Valencia, Spain <mapielin@alumni.uv.es>
[3]Department of Biodiversity and Biological Systematics, National Museum of Wales, U.K.
[4]Systematic Entomology Laboratory, USDA Beltsville Agricultural Research Center, Beltsville, Maryland, U.S.A.

SUMMARY

The information available on Coccoidea in the Galapagos Islands is sparse. Data on the species present, their distribution and host plants were compiled using recent information at the Charles Darwin Research Station and from the literature. Up to January 2008, 80 species from eight families were reported, more than doubling the total known in 2001. Of the 63 species whose origin has been determined, 50 are believed to have been introduced inadvertently on plants, fruits or vegetables, nine are endemic and four more are thought to be native. The low number of endemic and native species suggests that scale insects have been poor at reaching the islands naturally.

RESUMEN

Un inventario actualizado de los insectos escama (Hemiptera: Coccoidea) de las Islas Galápagos, Ecuador. La información disponible acerca de los Coccoidea de las Islas Galápagos es escasa. Datos de las especies presentes, su distribución y plantas hospederas fueron compiladas usando información de la Estación Científica Charles Darwin y la literatura. Hasta enero de 2008, 80 especies de ocho familias fueron reportadas, más que el doble del total conocido en 2001. De las 63 especies cuyo origen ha sido determinado, se cree que 50 han sido introducidas inadvertidamente sobre plantas, frutos o vegetales, nueve son endémicas y se piensa que cuatro son nativas. El bajo número de especies endémicas y nativas sugiere que los insectos escama no han sido buenos dispersándose a las islas en forma natural.

INTRODUCTION

Scale insects (Hemiptera: Coccoidea) are mainly small sap-sucking insects. They are widely distributed throughout the world except for the Arctic and Antarctic (Miller 2005). Many of the most successful species are pests of agriculture, horticulture and forestry (Miller & Davidson 1990, Miller *et al.* 2005), causing great economic losses annually (Kosztarab 1990). Individual species can infest leaves, fruit, branches, main stems, trunks or roots (Miller 2005). Because of their small size and habit of feeding in concealed areas, the insects are commonly transported on plant materials and frequently become invasive (Miller *et al*. 2005). Some species excrete large amounts of honeydew on which sooty moulds grow, which can cover the plant surface and severely restrict photosynthesis. Despite their small size, they are therefore economically and ecologically important on the Galapagos Islands.

Little is known about the Coccoidea of the Galapagos. The first specific surveys for them were carried out in 1973 and 1975 (Williams 1977), when few of the islands and habitats were examined. Prior to that, scale insects were occasionally found during general collections of invertebrates. The earliest records are of six species found on herbarium material collected by R. Snodgrass and E. Heller during 1898–9 and identified by Kuwana (1902) as *Orthezia galapagoensis* sp. nov., *Asterolecanium pustulans*, *Lecanium hemisphaericum*, *L. hesperidum pacificum* var. nov., *Aspidiotus lataniae* and *A. smilacis*. Morrison (1924) described five new species from material collected during the 1923 W. Beebe expedition: *Eriococcus papillosus*, *Margarodes similis*, *Phenacoccus parvus*, *Pseudococcus galapagoensis* and *P. insularis*. Two new species of mealybugs, *Rhizoecus insularis* and *Pseudococcus schusteri*, were described by Hambleton (1976) and Gimpel & Miller (1996) from specimens collected by R. Schuster in 1964. Williams (1977) reported three

undetermined diaspidids: *Chortinaspis* sp., *Velataspis* sp. and *Odonaspis* sp., the latter described by Ben-Dov (1988) as *O. galapagoensis* sp. nov.

Williams (1977) included 38 species from seven families in his review. An additional species, *Icerya purchasi*, was reported by Peck (2001), but he excluded an unidentified *Ceroplastes* species, thus leaving the total unchanged. Of these 38, nine are endemic to the Galapagos, two are native, 26 are thought to have been introduced inadvertently with imported plants, vegetables and fruits, and one is of undetermined origin.

Efforts to collect scale insects in the Galapagos intensified in 1998 when a project was initiated to evaluate the risks associated with using a ladybird predator (*Rodolia cardinalis*) to control the invasive scale insect, *Icerya purchasi* (Causton 2003, Causton *et al*. 2003). As part of this programme, it was necessary to identify which native scale insects could be at risk from the introduction of this predator. Plants, especially endemic species, were surveyed for scale insects and this provided many new scale insect species and host plant records. As a result of these surveys, it became obvious that there were many information gaps for this group and that other areas of the archipelago still needed to be surveyed. Since then, invertebrate monitoring by the Charles Darwin Research Station (CDRS), particularly recent surveys in agricultural and urban zones, has included the inspection of plants for scale insects.

Much of the information on scale insects in Galapagos is scattered in reports and databases. The objective of this study was to compile a comprehensive species list that included information on the distribution and host plants of scale insects present in the Galapagos Islands up until January 2008.

METHODS

Literature (including unpublished reports) and the invertebrates database of the CDRS were reviewed for records of scale insects. Specimens from the CDRS reference collection (IC CDRS) and specimens collected during recent surveys were identified by CH and DM.

In the following checklist, scale insect families are listed in alphabetical order, and new species, new islands and new host plant records since Peck (2001) are indicated with an asterisk. Following the species name and authority, status of the species is given in parentheses (E = endemic, found only in the Galapagos Archipelago; N = native, thought to occur naturally both in the Galapagos and elsewhere (usually Latin America); I = introduced, probably unintentionally brought to the islands in historical time by human agency or transport), then islands on which it occurs (Ba = Baltra; Bt = Bartolomé; Dp = Daphne; Dw = Darwin; Ed = Edén; Fe = Fernandina; Fl = Floreana; Ge = Genovesa; Is = Isabela; Ma = Marchena; PS = Plaza Sur; Pt = Pinta; Pz = Pinzón; Ra = Rábida; SCl = San Cristóbal; SCz = Santa Cruz; SF = Santa Fé; SN = Seymour Norte; Sgo = Santiago) and finally host plants recorded.

RESULTS

Asterolecaniidae

Asterolecanium pustulans (Cockerell, 1892). (I) Is. *Tournefortia pubescens.*

A. puteanum Russell, 1935. (I) Is. *Croton scouleri* var. *scouleri*, *Waltheria ovata.*

Coccidae

Ceroplastes cirripediformis Comstock, 1881. (I) Ba, Bt, Ed?, PS, SCl*, SCz, Sgo. *Cryptocarpus pyriformis*, *Laguncularia racemosa*, *Maytenus octogona*, *Passiflora edulis**, *Rhizophora mangle*, *Tiquilia darwinii*, *Tournefortia* sp.

C. floridensis Comstock, 1881*. (I) SCl*, SCz*. *Citrus sinensis**, *Maytenus octogona**, *Zanthoxylum fagara**.

C. rusci Linnaeus, 1758*. (I) Is*, SCz*. *Annona muricata**, *Cordia lutea**, *Hibiscus rosa-sinensis**, *Laguncularia racemosa**, *Spondias purpurea**.

C. sinensis Del Guercio, 1900*. (I) SCz*, Sgo*. *Croton scouleri**, *Galvezia leucantha**, *Lycium minimum**.

Ceroplastes* sp.. (?) Ed*, SCz*. *Annona cherimola**, *A. muricata**, *Cocos nucifera**, *Conocarpus erectus**, *Cordia lutea**, *Cyperus anderssonii**, *Galvezia leucantha**, *Mangifera indica**, *Maytenus octogona*, *Nerium oleander**, *Passiflora edulis**, *Pisonia floribunda**.

Coccus hesperidium Linnaeus, 1758. (I) Ba, Is, Pt, SCl*, SCz*, SN. *Cocos nucifera**, *Conyza bonariensis**, *Gossypium barbadense*, *Hibiscus rosa-sinensis**, *Ludwigia leptocarpa**, *Musa* sp., *Matisia cordata**, *Psidia carthagenensis**, *Psychotria rufipes*, *Roystonea regia**.

C. longulus Douglas, 1887*. (I) SCz*. *Citrus* sp.*, *Hibiscus rosa-sinensis**, *Rosa* hybrid cultivars*, *Terminalia catappa**.

C. viridis (Green, 1889). (I) Fl*, SCl*, SCz, Sgo*. *Cestrum auriculatum**, *Coffea* sp.*, *Inga* sp.*, *Laguncularia racemosa**, *Miconia robinsoniana**, *Musa* sp.*, *Psidium* sp., *P. guajava**.

Inglisia vitrea Cockerell, 1894*. (I) SCl*. *Annona cherimola**, *Inga* sp.*.

Parasaissetia nigra (Nietner, 1861). (I) PS, SCz. *Annona cherimola**, *Croton* sp., *Hibiscus* sp., *Maytenus octogona.*

***Parasaissetia* sp.** (?)*. SCz*. *Hibiscus rosa-sinensis**.

Pulvinaria psidii Maskell, 1893*. (I) SCl*, SCz*, SF*. *Chiococca alba**, *Citrus reticulata**, *Eriobotrya japonica**, *Miconia robinsoniana**, *Syzygium malaccense**.

P. urbicola Cockerell, 1893. (I) Fl*, SCz. *Annona muricata**, *Bryophyllum pinnatum**, *Tetramerium nervosum**.

Pulvinaria* sp.. (?) Is*, SCl*, SCz*, SF*. *Blechum pyramidatum**, *Chiococca alba**, *Hibiscus rosa-sinensis**, *Hippomane mancinella**. *Maytenus octogona**.

Saissetia coffeae (Walker, 1852). (I) Fl*, Is, SCl, SCz. *Ageratum conyzoides**, *Annona cherimola**, *A. muricata**, *Bidens pilosa**, *Bryophyllum pinnatum**, *Calandrinia galapagosa**, *Cestrum auriculatum**, *Citrus* sp.*, *Chiococca alba*, *Cinchona pubescens**, *Coffea* sp.*, *Conyza bonariensis**, *Cordia lutea*, *Croton scouleri**, *Cyperus anderssonii**, *Epidendrum spicatum**, *Helianthus annuus**, *Hibiscus*

*rosa-sinensis**, *Justicia galapagana**, *Mangifera indica**, *Maytenus octogona**, *Melia azedarach**, *Pelargonium* x *hortorum**, *Piscidia carthagenensis**, *Pseuderanthemum carruthersii**, *Psychotria rufipes*, *Rhizophora mangle*, *Ricinus communis*, *Ruellia malacosperma**, *Scalesia pedunculata*, *Sida rhombifolia**, *Syngonium* sp.*, *Tetramerium nervosum**, *Thelypteris poiteana**.

S. miranda (Cockerell & Parrott, 1899). (I) SCl. *Sida* sp.

S. neglecta De Lotto, 1969. (I) Bt, PS. *Maytenus octogona.*

Saissetia* sp.. (I) SCz*. *Annona muricata**.

Conchaspididae*

Conchaspis angraeci Cockerell, 1893*. (I) SCl*, SCz*. *Begonia* sp.*, Cactaceae*, *Carica papaya**, *Croton scouleri**, *Epiphyllum oxypetalum**, *Hibiscus rosa-sinensis**, *Huernia aspera**.

Diaspididae

Aonidiella aurantii (Maskell, 1879)*. (I) SCl*, SCz*. *Cocos nucifera**, *Laguncularia racemosa**.

A. orientalis (Newstead, 1894)*. (I) SCl*, SCz*. *Allamanda cathartica**, *Annona cherimola**, *Citrus* sp., *C. aurantium**, *Cocos nucifera**, *Melia azedarach**, *Nerium oleander**, *Terminalia catappa**.

Aspidiella hartii (Cockerell, 1895)*. (?) SCz*. *Miconia robinsoniana**.

Aspidiotus destructor Signoret, 1869. (I) SCz. *Parkinsonia aculeata**, *Phoenix dactylifera*, *Vallesia glabra*, *Zanthoxylum fagara**.

A. excisus Green, 1896*. (I) SCz*. *Castela galapageia**.

A.* near *pacificus Williams & Watson, 1990*. (I) SCz*. *Alternanthera halimifolia**, *Castela galapageia**, *Citrus* sp.*, *Croton* sp.*, *Phoenix dactylifera*, *Tournefortia rufo-sericea**, *Vallesia glabra.*

Chortinaspis* sp.. (E) SCz, SN. *Opuntia* sp., *O. echios* var. *zacana.*

***Chrysomphalus* sp.** (?) Sgo*. Host plants unknown.

Hemiberlesia lataniae (Signoret, 1869). (I) Ba, Is, Pt, SCl*, SCz, Sgo. *Acacia macracantha*, *Bursera graveolens*, *Cocos nucifera**, *Croton scouleri**, *Cryptocarpus pyriformis*, *Inga* sp.*, *Scalesia incisa*, *Waltheria ovata.*

H.* near *rapax. (?) SCz*. *Miconia robinsoniana**.

Howardia biclavis (Comstock, 1883). (I) SCl, SCz, Sgo. *Acacia macracantha*, *Chiococca* sp.*, *Citrus sinensis*, *Croton* sp.*, *Waltheria ovata.*

Ischnaspis longirostris (Signoret, 1882)*. (I) SCz*. *Coffea* sp.*, *Citrus* sp.*.

Lepidosaphes beckii (Newman, 1867). (I) Fl*, SCz. *Citrus* sp., *C. aurantium**, *Croton scouleri**, *Mangifera indica**, *Musa acuminata**.

Lepidosaphes* sp.. (?) SCz*. *Pseuderanthemum carruthersii**.

Melanaspis odontoglossi (Cockerell, 1893). (I) Is, SCz, Sgo. *Alternanthera filifolia*, *Conocarpus erectus*, *Croton scouleri* var. *scouleri*, *Cryptocarpus pyriformis*, *Maytenus octogona*, *Scalesia affinis*, *Waltheria ovata.*

Melanaspis tenebricosa (Comstock, 1881)*. (?) SCz*. *Zanthoxylum fagara**.

Odonaspis galapagoensis Ben-Dov, 1977*. (E) SCz*. *Sporobolus virginicus.*

Parlatoria crotonis (Douglas, 1887). (I) SCz. *Croton scouleri.*

Pinnaspis strachani (Cooley, 1899). (I) Bt, Fe, Fl*, Ge*, Is, PS, Pt, SCl*, SCz, Sgo, SN. *Abutilon depauperatum**, *Annona muricata**, *Bastardia viscosa**, *Cassia occidentalis**, *Chamaesyce amplexicaulis*, *Chiococca alba**, *C. alba**, *Cocos nucifera**, *Conocarpus erectus*, *Cordia leucophlyctis**, *C. lutea*, *Croton scouleri*, *Citrus* sp.*, *Cryptocarpus pyriformis*, *Cucumis dipsaceus**, *Euphorbia* sp., *Gossypium* sp.*, *G. barbadense*, G. *darwinii**, *Hibiscus rosa-sinensis**, *H. tiliaceus*, *Hippomane mancinella*, *Hyptis* sp.*, *Lantana peduncularis**, *Mangifera indica**, *Neptunia plena*, *Nerium oleander**, *Parkinsonia aculeata*, *Passiflora quadrangularis**, *Polygala anderssonii*, *P. galapageia*, *P. sancti-georgii* var. *oblanceolata*, *Sansevieria trifasciata**, *Scalesia affinis*, *S. incisa*, *Scutia pauciflora*, *Sida paniculata**, *Tiquilia darwinii*, *Tournefortia* sp., *T. rufo-sericea**, *Vallesia glabra* var. *pubescens*, *Waltheria ovata*, *Zanthoxylum fagara**.

Pseudaulacaspis major (Cockerell, 1894). (I) SCz*, Sgo. *Annona muricata**, *Cordia lutea*, *Croton scouleri**, *Hippomane mancinella*, *Zanthoxylum fagara**.

Pseudaonidia trilobitiformis Green, 1896*. (I) SCz*. *Citrus limetta**.

Selenaspidis articulatus (Morgan, 1889). (I) Fl*, Is*, SCl, SCz, Sgo. *Castela galapageia*, *Citrus* sp.*, *C. limetta*, *Chiococca alba**, *Eriobotrya japonica**, *Hippomane mancinella**, *Inga* sp.*, *Vallesia glabra* var. *pubescens.*

Unaspis citri (Comstock, 1883)*. (I) SCl*, SCz*. *Citrus* sp.*, *Inga* sp.*.

***Velataspis* sp.** (E?) PS, Sgo. *Maytenus octogona.*

Eriococcidae

Eriococcus* near *dubius*. (?) SCz*. *Alternanthera halimifolia**, *Croton scouleri**.

E. papillosus Morrison, 1924. (E?) Bt, Is, SCz, Sgo, SN. *Alternanthera filifolia**, *Chamaesyce amplexicaulis*, *Croton scouleri*, *Cryptocarpus pyriformis*, *Euphorbia equisetiformis*, *Heliotropium angiospermum*, *Jasminocereus* sp., *Tiquilia darwinii*, *T. nesiotica*, *Waltheria ovata.*

Eriococcus* sp.. (?) Is*. *Darwiniothamnus tenuifolius**.

Margarodidae

Icerya purchasi Maskell, 1878. (I) Ba, Ed*, Fe*, Fl, Ge*, Is, Ma, Pz, Pt*, Ra*, SCl, SCz, SF*, Sgo, SN. *Acacia insulae-iacobi*, *A. macracantha*, *A. nilotica**, *A. rorudiana*, *Acalypha abingdonii*, *Alternanthera echinocephala*, *Annona cherimola**, *Avicennia germinans**, *Bastardia viscosa*, *Bauhinia monandra*, *Begonia* sp.*, *Blechum pyramidatum*, *Borreria ericaefolia*, *Brassica oleracea*, *Brickellia diffusa**, *Bursera graveolens**, *Cajanus cajan*, *Calandrinia galapagosa*, *Canavalia rosea*, *Centrolobium paraense*, *Chamaesyce amplexicaulis*, *C. viminea*, *Chiococca alba*, *Citrus* sp., *C. aurantiifolia**, *C. sinensis**, *Clerodendrum molle**, *Cocos nucifera*, *Commicarpus tuberosus*, *Conocarpus erectus**, *Cordia leucophlyctis*, *Cordia lutea*, *Crotalaria incana**, *Croton scouleri*, *Cryptocarpus pyriformis*, *Cyclospermum leptophyllum*, *Cyperus anderssonii*, *Darwiniothamnus lancifolius*, *D. tenuifolius*, *Desmanthus virgatus**, *Desmodium glabrum**, *D. incanum*, *Euphorbia cyathophora**, *Ficus* sp.*, *Gamochaeta purpurea*, *Gossypium darwinii*, *G. klotzschianum*, *Heliotropium angiospermum**, *Hibiscus rosa-sinensis**, *H. tiliaceus*, *Hyptis pectinata*, *Inga edulis**, *Ipomoea habeliana*, *I. nil*, *I. pes-caprae*, *Jasminocereus thouarsii**, *Laguncularia racemosa*, *Lantana camara**, *L. peduncularis*, *Lecocarpus*

darwinii, *L. pinnatifidus*, *Macraea laricifolia*, *Mangifera indica**, *Matisia cordata**, *Maytenus octogona*, *Merremia aegyptia*, *Mentha piperita*, *Nerium oleander*, *Neptunia plena**, *Ocimum basilicum*, *Parkinsonia aculeata*, *Passiflora quadrangularis**, *Phaseolus mollis*, *P. vulgaris*, *Phyllanthus caroliniensis*, *P. acidus**, *Piscidia carthagenensis*, *Pisonia floribunda*, *Plumbago scandens*, *Polygala galapageia*, *Porophyllum ruderale**, *Portulaca oleracea**, *Prosopis juliflora*, *Psidium guajava**, *Psychotria rufipes*, *Punica granatum*, *Rhizophora mangle*, *Rhynchosia minima*, *Ricinus communis*, *Rosa* hybrid cultivars, *Russelia equisetiformis*, *Scaevola plumieri*, *Scalesia aspera*, *S. atractyloides*, *S. baurii*, *S. cordata*, *S. divisa*, *S. gordilloi*, *S. helleri*, *S. pedunculata*, *Scoparia dulcis**, *Senna obtusifolia*, *S. occidentalis*, *S. pistaciifolia*, *Stylosanthes sympodiales**, *Tectona grandis*, *Tournefortia psilostachya**, *T. rufo-sericea*, *Trema micrantha*, *Vallesia glabra*, *Vigna luteola**.

Margarodes similis Morrison, 1924. (E?) Ba, Bt*, Ed, SCz. *Bursera malacophylla*, *Maytenus octogona*, *Scaevola plumieri**.

Ortheziidae

Insignorthezia insignis (Browne, 1887). (I) Is*, SCl, SCz*. *Adenostemma platyphyllum**, *Ageratum conyzoides**, *Bidens riparia**, *Blechnum* sp., *Borreria laevis**, *Browallia americana**, *Dioclea* sp., *Diodia radula**, *Darwiniothamnus tenuifolius**, *Hyptis pectinata**, *Hypericum* sp., *Jaegeria gracilis*, *Justicia galapagana**, *Ludwigia leptocarpa**, *Mecardonia procumbens**, *Pseudelephantopus spicatus**, *Phyllanthus* sp., *Scalesia cordata*, *S. pedunculata*, *Scoparia dulcis**, *Stachytarpheta cayennensis**, *Tetramerium nervosum**, *Verbena litoralis*.

Praelongorthezia galapagoensis (Kuwana, 1902). (E?) Is, Pz, SCz*, Sgo, SN. *Bursera graveolens*, *Cordia lutea*, *Cryptocarpus pyriformis*, *Heliotropium angiospermum*, *Hibiscus rosa-sinensis**, *Scalesia microcephala*.

P. praelonga (Douglas, 1891). (I) Fe, SCl*, SCz*. *Capsicum* sp., *Chiococca alba**, *Citrus* sp., *Croton scouleri**, *Hibiscus* sp., *H. rosa-sinensis**, *Nerium oleander**, *Terminalia catappa**.

Praelongorthezia* sp.. (?) SCz*. *Pelargonium* x *hortorum**.

Pseudococcidae

Antonina graminis (Maskell, 1897)*. (?) SCz*. *Digitaria horizontalis**, *Sporobolus virginicus**.

Chorizococcus nakaharai Williams & Granada de Willink, 1992*. (N?) Is*. Host plants unknown.

Chorizococcus* sp.. (?) SCz*. *Paspalum conjugatum**.

Dysmicoccus boninsis (Kuwana, 1909)*. (I) Fl*, SCl*, SCz*. *Citrus* sp.*, *Paspalum conjugatum**, *Saccharum officinarum**.

D. brevipes (Cockerell, 1893)*. (I) Fl*, Is*, SCz*. *Ananas comosus**, *Annona muricata**, *Cyperus anderssonii**.

Ferrisia virgata (Cockerell, 1893). (I) Ba, Is, SCz, Sgo. *Bursera graveolens*, *Tiquilia darwinii*, *Hibiscus tiliaceus*, *Hippomane mancinella*, *Ipomoea pes-caprae**, *Laguncularia racemosa*, *Tribulus cistoides*, *Waltheria ovata*.

Geococcus coffeae Green, 1933. (I) SCz. *Musa* sp.

Nipaecoccus nipae (Maskell, 1893)*. (I) Fl*, Is*, SCl*, SCz*. *Annona cherimola**, *A. muricata**, *Cocos nucifera**, *Psidium guajava**, *Hibiscus rosa-sinensis**.

Paracoccus solani Ezzat & McConnell, 1956*. (I) Ed*, Dp*, Is*, SCl*, SCz*, Sgo*. *Bougainvillea* sp.*, *Chamaesyce amplexicaulis**, *Galvezia leucantha**, *Gossypium* sp., *Hyptis* sp.*, *Heliotropium angiospermum**, *Lantana* sp.*, *Laguncularia racemosa**, *Scalesia aspera*, *Sida spinosa**, *S. hederifolia**, *Tribulus terrestris**.

Phenacoccus herreni Cox & Williams, 1981*. (I) SCz*. *Stictocardia tiliifolia**.

P. parvus Morrison, 1924. (I) Gen. Host plants unknown.

P. solenopsis Tinsley, 1898*. (I) SCl*, SCz*, Sgo*. *Annona muricata**, *Hibiscus* sp.*, *H. rosa-sinensis**, *Psidium guajava**, *Scalesia atractyloides**.

Phenacoccus* sp.. (N?) Fl*, SCz*. *Cordia* sp., *Lecocarpus pinnatifidus*.

Planococcus citri (Risso, 1813). (I) SCl, SCz. *Annona muricata**, *Alternanthera echinocephala**, *Asparagus officinalis**, *Blechum pyramidatum*, *Cordia lutea**, *Croton scouleri**, *Cryptocarpus pyriformis**, *Huernia aspera**, *Ixora coccinea**, *Jatropha curcas*, *Miconia robinsoniana**, *Nerium oleander**, *Polyscias scutellaria**, *Psidium guajava*, *Ricinus communis*, *Scalesia pedunculata**, *Solanum cheesmaniae**, *Stictocardia tiliifolia**, *Tournefortia pubescens**.

P. minor? (Maskell, 1897)*. (I) Fl*, SCl*, SCz*. *Ananas comosus**, *Citrus reticulata**, *Hibiscus rosa-sinensis**, *Miconia robinsoniana**, *Phaseolus vulgaris**, *Psidium guajava**, *Sida paniculata**, *Solanum* sp.*.

Planococcus* sp.. (?) SCl*, SCz*. *Ananas comosus**, *Passiflora edulis**, *Solanum quitoense**.

Pseudococcus elisae Borchsenius, 1948*. (I) SCz*. *Tournefortia psilostachya**.

P. galapagoensis Morrison, 1924. (E) Ed, SCz. Host plants unknown.

P. insularis Morrison, 1924. (E) Ba. Host plants unknown.

P.* near *landoi (Balachowsky, 1959)*. (?) SCz*. *Ananas comosus**, *Passiflora* sp.*, *P. edulis**.

P. longispinus Targioni, 1867*. (I) SCz*. *Rosa* sp.*, *Nerium oleander **.

P. schusteri Gimpel & Miller, 1996*. (N?) SCz*. *Acacia macracantha**.

***Pseudococcus* sp.** (?) Bt, Dw, Es*, Fe, Is, PS, Pz, SCz, Sgo, SN. *Alternanthera filifolia*, *Castela galapageia**, *Chamaesyce amplexicaulis*, *Cryptocarpus pyriformis**, *Jasminocereus* sp., *Laguncularia racemosa*, *Maytenus octogona*, *Opuntia* sp.*, *Scalesia affinis**, *S. incisa*, *S. villosa**, *Scutia spicata* var. *pauciflora*, *Vallesia glabra* var. *pubescens*, *Waltheria ovata**.

Rhizoecus insularis Hambleton, 1976. (E) SCz. *Hippomane mancinella*.

R. latus (Hambleton, 1946). (N) SCz. *Hippomane mancinella*.

Rhizoecus* sp.. (?) Is*. Host plants unknown.

DISCUSSION AND CONCLUSIONS

To date, 80 species from eight families have been reported from the Galapagos Islands. Of the 63 species whose origin has been determined, 50 are believed to be introduced species, nine endemic, and four are thought to be native.

The low numbers of endemic and native species suggest that scale insects have not been good at dispersing naturally to these islands, and most scale insect stages are indeed sedentary (Hodgson 2001). On the other hand,

many of the new records are of cosmopolitan pests that were probably introduced to Galapagos on imported fruits, vegetables or ornamental plants, particularly over the last decade, as population has increased rapidly and large amounts of such material have been brought in (CDF *et al.* 2008).

The number of new records (more than doubling the total in Peck 2001) suggests a need for more surveys to complete the checklist of scale insects of the Galapagos Islands.

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