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The scale insects (Hemiptera: Coccoidea) of Israel—checklist, host plants, zoogeographical considerations and annotations on species

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ABSTRACT

One hundred sixty-six species of scale insects in 13 families are listed from Israel, as follows: Aclerdidae—2, Asterolecaniidae—5, Coccidae—35, Diaspididae—62, Eriococcidae—4, Kermesidae—8, Lecanodiaspididae—2, Matsucoccidae—1, Micrococcidae—1, Monophlebidae—4, Phoenicococcidae—1, Pseudococcidae – 40 and Putoidae – 1 species. The family Aclerdidae is recorded for the first time from Israel in this study with two species, namely *Aclerda berlesii* Buffa, and *Aclerda panica* Hall. The Diaspidid—*Aspidiotus hedericola* Lindinger, the Eriococcid *Ovaticoccus agavium* (Douglas), the Monophlebid—*Icerya aegyptiaca* (Douglas) and the Pseudococcid—*Phenacoccus emansor* Williams and Kozarzhevskaya are newly recorded from Israel. The species comprise elements of five groups, namely, Indigenous—Middle-Eastern, Afrotropical, Mediterranean, Palearctic, Cosmopolitan. Twenty species are deleted from the list.

KEYWORDS: Hemiptera, Coccoidea, scale insects, Israel

INTRODUCTION

Scale insects (Hemiptera: Sternorrhyncha: Coccoidea) are a relatively small superfamily with nearly 8000 species classified in 46 families (Ben-Dov et al., 2010). About a third of the families include only fossil coccoids, whereas 31 families comprise extant species. They are all plant feeders, using their stylet-like mouthparts to suck plant sap. The adult females are wingless and considered to be paedomorphic, whereas the adult males in most species are alate and capable of flying. The size of adult females varies between the Coccoidea families, e.g., 1 mm diameter in some Diaspididae, as compared to 35 mm in several species of the Monophlebidae. Some species develop at cryptic sites of their host plants, therefore might be hard to detect. Many species of scale insects are important pests of agriculture, horticulture and forestry. Only 12 families of scale insects occur in Israel, but several species are pests of great economic importance. Fossil scale insects were not recorded in Israel; however Koteja and Azar (2008) extensively reported and described scale insects from impressions in Lebanese amber.

Fritz Shimon Bodenheimer (1897–1959) (see Harpaz, 1984) initiated modern studies on the fauna, taxonomy, and economic importance of the scale insects of Israel in the early 1920s. In the following years, Bodenheimer extensively studied this group in Israel and his findings were reported by numerous publications (Bodenheimer, 1924, 1926, 1927, 1927a,b, 1930, 1931, 1935, 1937, 1938, 1951a,b). During and after Bodenheimer's period, more contributions to the knowledge of the Coccoidea in Israel were added by several researchers, including Balachowsky (1948, 1950, 1951, 1953, 1953a, 1954), Ben-Dov (1968, 1969, 1970, 1971, 1975, 1977, 1978, 1980, 1981, 1985, 1986, 1987, 1988, 1991, 2001, 2001a,b, 2005, 2005a, 2008, 2009), Ben-Dov et al. (2005), Ben-Dov and Guerrieri (2009), Ben-Dov and Kaydan (2008), Ben-Dov and Skutelsky (2003), Ben-Dov and Venezian, (1983), Ben-Dov et al. (2000), Bytinski-Salz (1961, 1966), Bytinski-Salz and Sternlicht (1967), Furth et al. (1984), Gerson (1964), Gerson et al. (1975), Gerson and Zor (1973), Sternlicht (1969), and Williams (1958).

This paper presents an up-to-date (December, 2010) list of 166 species belonging to the 12 known families of scale insects of Israel. Taxa, which are newly recorded here for Israel, are indicated with an asterisk.

KEY TO COCCOIDEA FAMILIES IN ISRAEL

The taxonomy of scale insects is based mainly on the morphology of cuticular structures and body appendages of the insect. Most structures, which are of taxonomic significance, are comparatively minute in size (ranging from 5 μm to 100 μm) and can be observed by microscopic study of carefully processed, slide-mounted specimens. The methodology for slide-mounting of scale insects was outlined by Ben-Dov and Hodgson (1997). In the following, key I have adopted the terms for morphological characters which are currently widely used in the taxonomy of scale insect studies (e.g., Hodgson, 1994; Williams, 1985, 2004).

The identification of taxa at the family, genus and species level is based mainly on study of slide-mounted adult females, which is also true for the following key.

1. Abdominal spiracles present **2**
-. Abdominal spiracles absent **3**
2. Mouth parts present ..... **Monophlebidae**
-. Mouth parts absent ..... **Matsucoccidae**
3. Anal opening covered with one or two plates **4**
-. Anal opening not covered with plates **6**
4. Anal opening covered with one plate ..... **Aclerdidae**
-. Anal opening covered with two plates **5**
5. Anal opening covered with two triangular plates; without an arched plate in front of the anal plates ..... **Coccidae**
-. Anal opening covered with two triangular plates; with an arched plate in front of the anal plates ..... **Lecanodiaspididae**
6. Posterior abdominal segments forming a pygidium with a fringe of ducts, plates and lobes .... **Diaspididae**

-. Posterior abdominal segments not forming a pygidium **7**
7. Vulva placed ventrally on abdominal segment VI ..... **Micrococcidae**
-. Vulva placed ventrally on or between abdominal segments VII and VIII **8**
8. Antenna 1-segmented **9**
-. Antenna with more than 1 segment **11**
9. Legs present, segments reduced ..... **Kermesidae**
-. Legs entirely absent **10**
10. Anal ring with 2 setae ..... **Phoenicococcidae**
-. Anal ring with 6 setae ..... **Asterolecaniidae**
11. With one or more of the following characters present: ventral circulus or circuli, dorsal ostioles, 1–18 cerarii and trilocular pores **12**
-. Without ventral circulus or circuli, dorsal ostioles, cerarii or trilocular pores. All of these might be lacking from a single scale ..... **Eriococcidae**
12. Each coxa with 2 sensory pores on each of ventral and dorsal surfaces of the segment ..... **Pseudococcidae**
-. Each coxa with 3 sensory pores on each of ventral and dorsal surfaces of the segment ..... **Putoidae**

LIST OF FAMILIES, SPECIES, AND HOST PLANTS

This list (up-to-date 2010) of 166 species belonging to 13 families of scale insects of Israel is based on material from the collection of F.S. Bodenheimer (deposited in The Coccoidea collection, Department of Entomology, Agricultural Research Organization, Bet Dagan, Israel), and on about 5000 accessions which I have collected and studied in Israel since the early 1960s.

This checklist presents the currently accepted valid name of each species listed under its respective family, followed by a list of the host plants on which the scale insects were recorded in Israel. The list is concluded with notes on several scale insect species that have been recorded from Israel in publications, but do not occur in Israel. Several taxa are newly recorded here from Israel and these are indicated with an asterisk. Supplementary data on the taxa included in the following list are available in ScaleNet, A Systematic Database of the Scale Insects of the World http://www.sel.barc.usda.gov/scalenet/scalenet.htm (Ben-Dov and Miller, 2010).

Any host plant newly-recorded for a certain scale insect in this paper, is indicated by the character + preceding the name of the plant.

Slide-mounted specimens of most of the species listed here are deposited in The Coccoidea collection, Department of Entomology, Agricultural Research Organization, Bet Dagan, Israel (**ICVI**). Materials of a few species are also deposited at one or all of the following collections: The Natural History Museum, London, UK (**BMNH**); Muséum National d'Histoire Naturelle, Paris, France (**MNHN);** United States National Entomological Collection, U.S. National Museum of Natural History, Washington, D.C., USA (**USNM**).

*ACLERDIDAE

Aclerda berlesii Buffa
Poaceae: *Phragmites australis, Saccharum officinarum*.

Aclerda panica Hall
Poaceae: *Arundo donax*, *Phragmites australis*.

ASTEROLECANIIDAE

Asterodiaspis variolosa (Ratzeburg)
Fagaceae: *Quercus calliprinos, Q. ithaburensis*.

Bambusaspis bambusae (Boisduval)
Poaceae: *Bambusa* sp.

Palmaspis phoenicis (Ramachandra Rao)
Arecaceae: *Phoenix dactylifera*.

Pollinia pollini (A. Costa)
Moraceae: *Ficus carica*. **Oleaceae**: *Olea europaea*.

Russellaspis pustulans (Cockerell)
Anacardiaceae: *Mangifera indica*. **Apocynaceae**: *Nerium oleander.* **Asclepiadaceae**: **Moraceae**. *Ficus carica, F. sycomorus*. **Oleaceae**: *Jasminum sambac*. **Passifloraceae**: *Passiflora edulis*.

COCCIDAE

Acantholecanium haloxyloni (Hall)
Chenopodiaceae: *Hammada salicornia*.

Acanthopulvinaria orientalis (Nasonov)
Chenopodiaceae: *Haloxylon*.

Anapulvinaria pistaciae (Bodenheimer)
Anacardiaceae: *Pistacia palestina, P. terebinthus, P. vera*.

Bodenheimera rachelae (Bodenheimer)
Verbenaceae: *Vitex agnus-castus*.

Ceroplastes floridensis Comstock
Anacardiaceae: *Mangifera indica, Pistacia lentiscus*. *Schinus molle, S. terebinthifolius*. **Apocynaceae**: *Nerium oleander, Plumeria rubra, Thevetia peruviana*. **Araliaceae**: *Hedera helix*. **Araceae**: *Philodendron* sp. **Asclepiadaceae**: *Periploca graeca*. **Asteraceae**: *Erigeron crispus*. **Bignoniaceae**: *Kigelia pinnata, Stenolobium stans*. **Boraginaceae**: *Cordia myxa*. **Cactaceae**: *Epiphyllum* sp. **Celastraceae**: *Euonymus japonicus*, **Combretaceae**: *Terminalia arjuna*. **Cycadaceae**: *Cycas revoluta*. **Ebenaceae**: *Diospyros kaki*. **Elaeagnaceae**: *Elaeagnus angustifolia*. **Ericaceae**: *Arbutus*

unedo. **Fabaceae**: *Retama raetam*. **Lauraceae**: *Laurus nobilis*, *Persea americana*. **Moraceae**: *Ficus benghalensis, F. retusa, F. rubiginosa*. **Myoporaceae**: *Myoporum laetum*. **Myrtaceae***: Callistemon phoeniceus, Feijoa sellowiana, Melaleuca armillaris, Psidium guajava*. **Pinaceae**: *Pinus halepensis*. **Pittosporaceae**: *Pittosporum undulatum*. **Polypodiaceae**: *Nephrolepis exaltata*. **Rosaceae**: *Crataegus azarolus, Eriobotrya japonica, Rhaphiolepis umbellata*. **Rutaceae**: *Citrus aurantium, C. grandis, C. limon, C. paradisi, C. reticulata*. **Sapindaceae**: *Dodonaea viscosa*. **Verbenaceae**: *Duranta repens*.

Ceroplastes rusci (Linnaeus)

Anacardiaceae: *Mangifera indica, Pistacia lentiscus, P. palestina, Rhus coriaria*. **Apocynaceae**: *Nerium oleander*. **Apocynaceae**: *Thevetia peruviana*. **Boraginaceae**: *Cordia myxa*. **Cannaceae**: *Canna* sp.. **Cyperaceae**: *Cyperus flabelliformis*. **Lauraceae**: *Persea americana*. **Loranthaceae**: *Loranthus acaciae*. **Moraceae**: *Ficus benghalensis, F. carica, F. rubiginosa, F. sycomorus, Morus alba*. **Myrtaceae**: *Myrtus communis*. **Platanaceae**: *Platanus orientalis*. **Proteaceae**: *Grevillea robusta*. **Ranunculaceae**: *Clematis cirrhosa*. **Rosaceae**: *Crataegus azarolus, Cydonia oblonga*. **Rutaceae**: *Citrus aurantium, C. grandis, C. limon, C. paradisi, C. reticulata*. **Salicaceae**: *Populus deltoides, Salix*. **Sapindaceae**: *Litchi chinensis*. **Strelitziaceae**: *Strelitzia* sp., *S. reginae* **Vitaceae**: *Vitis vinifera*.

Coccus capparidis (Green)

Myoporaceae: *Myoporum acuminatum*. **Rutaceae**: *Citrus aurantium, C. paradisi*.

Coccus elatensis Ben-Dov

Anacardiaceae: *Mangifera indica*.

Coccus hesperidum Linnaeus

Anacardiaceae: *Mangifera indica, Pistacia palestina*. **Apocynaceae**: *Nerium oleander, Thevetia peruviana, Vinca major.* **Araceae**: *Acorus* sp., *Philodendron* sp., *Pothos* sp. **Araliaceae**: *Hedera helix, Schefflera arboricola*. **Asclepiadaceae**: *Araujia* sp., *Asclepias* sp. **Aspleniaceae**: *Asplenium viviparum*. **Asteraceae**: *Erigeron crispus, Gerbera* sp. **Balasaminaceae**: *Impatiens* sp. **Bignoniaceae**: *Tecoma capensis*. **Cucurbitaceae**: *Cucurbita* sp. **Ebenaceae**: *Diospyros kaki*. **Fabaceae**: *Bauhinia* sp., *Cercis siliquastrum, Erythrina zeyheri*. **Frankeniaceae**: *Frankenia* sp. **Lauraceae**: *Laurus indica, L. nobilis, Persea americana*. **Liliaceae**: *Haworthia* sp., *Ruscus aculeatus*. **Meliaceae**: *Melia azedarach*. **Moraceae**: *Eugenia uniflora, Ficus benghalensis, F. carica, F. nitida, F. sycomorus, Morus alba*. **Musaceae**: *Strelitzia reginae*. **Myrtaceae**: *Feijoa sellowiana, Myrtus communis, Psidium guajava*. **Pinaceae**: *Cedrus* sp., *Pinus halepensis*. **Piperaceae**: *Piper chaba*. **Platanaceae**: *Platanus orientalis*. **Punicaceae**: *Punica granatum*. **Rosaceae**: *Cotoneaster pannosus, Crataegus azarolus, Prunus* sp., *Rosa* sp., *Rubus* sp. **Rutaceae**: *Citrus aurantium, C. grandis, C. limon, C. paradisi, C. reticulata*. **Sapindaceae**: *Litchi chinensis*. **Verbenaceae**: *Avicennia marina, Vitex agnus-castus*. **Viscaceae**: *Viscum* sp. **Vitaceae**: *Vitis vinifera*.

Coccus longulus (Douglas)
Annonaceae: *Annona squamosa*. **Fabaceae**: *Ceratonia siliqua, Prosopis farcta*. **Lauraceae**: *Laurus nobilis, Persea americana*. **Marantaceae**: *Maranta* sp. **Moraceae**: *Ficus benghalensis, F. carica, F. lyrata, F. nitida, F. retusa, F. rubiginosa, Morus alba*. **Oxalidaceae**: *Averrhoa carambola*. **Plumbaginaceae**: *Plumbago capense*. **Polygonaceae**: *Hamalocladium platycladum*. **Rutaceae**: *Citrus reticulata*. **Sapindaceae**: *Litchi chinensis*

Coccus pseudomagnoliarum (Kuwana)
Rutaceae: *Citrus aurantium, C. limon*.

Eriopeltis festucae (Boyer de Fonscolombe)
Poaceae: *Phalaris* sp.

Eriopeltis lichtensteini Signoret
Poaceae.

Exaeretopus harpazi Ben-Dov
Poaceae: *Aegilops* sp., *Avena sterilis, Hordeum spontaneum, Lolium rigidum, Triticum* sp.

Filippia follicularis (Targioni Tozzetti)
Oleaceae: Olea europaea.

Kenima galilit Ben-Dov
Fagaceae: *Quercus calliprinos, Q. ithaburensis*.

Lichtensia viburni Signoret
Oleaceae: *Olea europaea, Phyllirea latifolia*.

Milviscutulus mangiferae (Green)
Anacardiaceae: *Mangifera indica, Schinus terebinthifolius*. **Apocynaceae**: *Thevetia peruviana*. **Araliaceae**: *Hedera helix*. **Lauraceae**: *Laurus nobilis*, *Persea americana*. **Meliaceae**: *Melia azedarach*. **Myrtaceae**: *Eugenia jambolana, Myrtus communis*, *Psidium guajava*. **Oleaceae**: *Ligustrum* sp. **Rutaceae**: *Citrus aurantium*.

Palaeolecanium bituberculatum (Signoret)
Rosaceae: *Crataegus azarolus*.

Parasaissetia nigra (Nietner)
Anacardiaceae: *Mangifera indica*. **Cucurbitaceae**: *Cucurbita moschata*. **Loranthaceae**: *Loranthus acaciae*. **Magnoliaceae**: *Magnolia* sp. **Moraceae**: *Ficus nitida, F. sycomorus*. **Passifloraceae**: *Passiflora edulis*. **Sapindaceae**. *Litchi chinensis*.

Parthenolecanium corni (Bouché)
Rosaceae: *Prunus domestica*.

Parthenolecanium persicae (Fabricius)
Ebenaceae: *Diospyros kaki*. **Rosaceae**: *Prunus* sp.

Protopulvinaria pyriformis (Cockerell)
Anacardiaceae: *Mangifera indica*. **Apocynaceae**: *Trachelospermum jasminoides*. **Araliaceae**: *Fatsia japonica, Scheflera papaya*. **Asclepiadaceae**: *Araujia sericifera*. **Caprifoliaceae**: *Hedera helix, Lonicera caprifolium*. **Caricaceae**: *Carica papaya*. **Lauraceae**: *Laurus nobilis*, *Persea americana*. **Moraceae**: *Ficus*. **Myrtaceae**: *Eugenia jambolana, Psidium guajava*. **Rutaceae**: *Citrus aurantium*.

Pulvinaria psidii Maskell
Anacardiaceae: *Schinus molle*. **Apocynaceae**: *Plumeria* sp.. **Araliaceae**: *Hedera helix*. **Bignoniaceae**: *Tecoma stans*. **Meliaceae**: *Melia azedarach*. **Moraceae**: *Ficus* sp., *F. lyrata*. **Myrtaceae**: *Psidium guajava*. **Oleaceae**: Undetermined species. **Pittosporaceae**: *Pittosporum tobira*. **Sapindaceae**: *Litchi chinensis*.

Pulvinaria urbicola Cockerell
Pteridophyta. **Verbenaceae**: *Citharexylum spinosum*.

Pulvinaria vitis (Linnaeus)
Salicaceae: *Populus* sp. **Vitaceae**: *Vitis vinifera*.

Pulvinariella mesembryanthemi (Vallot)
Aizoaceae: *Mesembryanthemum* sp.

Rhizopulvinaria artemisiae (Signoret)
Asteraceae: *Artemisia monosperma*.

Saissetia coffeae (Walker)
Anacardiaceae: *Mangifera indica*. **Apocynaceae**: *Beaumontia grandiflora, Carissa grandiflora*. **Araliaceae**: *Aralia elegantissima*. **Asclepiadaceae**: *Hoya carnosa*. **Asteraceae**: *Gerbera* sp. **Begoniaceae**: *Begonia capensis*. **Bignoniaceae**: **Cactaceae**: *Epiphyllum* sp. **Cycadaceae**: *Cycas* sp., *Cycas migueli*. **Dryopteridaceae**: *Cyrtomium falcatum*. **Liliaceae**: *Asparagus* sp., *Chlorophytum* sp. **Musaceae**: *Musa* sp. **Myoporaceae**: *Myoporum acuminatum*. **Myrtaceae**: *Myrtus communis*, **Polypodiaceae**: *Platycerium bifurcatum*. **Oleaceae**: *Olea europaea, Phillyrea media*. **Orchidaceae**: *Phaelenopsis* sp. **Polemoniaceae**: *Phlox* sp. **Polypodiaceae**: *Adiantum capillus-veneris, Nephrolepis* sp., *Platycerium bifurcatum*. **Rubiaceae**: *Coffea arabica*. **Rutaceae**: *Citrus paradise*. **Sapotaceae**: *Achras sapota*. **Verbenaceae**: *Duranta repens*.

Saissetia oleae (Olivier)
Anacardiaceae: *Mangifera indica, Pistacia atlantica, P. palestina*. **Apocynaceae**: *Nerium oleander.* **Asteraceae**: *Chrysanthemum* sp., *Erigeron* sp. **Cucurbitaceae**: *Cucurbita* sp. **Cycadaceae**: *Cycas* sp. **Liliaceae**: *Asparagus aphyllus*. **Malvaceae**: *Hibiscus rosa-sinensis*. **Moraceae**: *Ficus carica*. **Myoporaceae**: *Myoporum laetum*. **Oleaceae**: *Olea europaea*. **Punicaceae**: *Punica granatum*. **Rubiaceae**: *Coffea* sp. **Rutaceae**: *Citrus aurantium, C. limon*. **Solanaceae**: *Solanum tuberosum*.

Saissetia privigna De Lotto
Anacardiaceae: *Mangifera indica*. **Malvaceae**: *Gossypium hirsutum*.

Sphaerolecanium prunastri (Boyer de Fonscolombe)
Rosaceae: *Prunus domestica, P. pissardii, P. salicina, P. ursina*.

Stotzia ephedrae (Newstead)
Ephedraceae: *Ephedra* sp. **Liliaceae**: *Asparagus* sp.

Waxiella mimosae (Signoret)
Fabaceae: *Acacia radianna, A. tortilis*. **Loranthaceae**: *Loranthus acaciae*.

Waxiella tamaricis Ben-Dov
Tamaricaceae: *Tamarix articulata*.

DIASPIDIDAE

Abgrallaspis cyanophylli (Signoret)
Aizoaceae: *Mesembryanthemum* sp. **Amaryllidaceae**: *Amaryllis* sp. **Annonaceae**: *Annona* sp. **Asteraceae**: *Gazania* sp. **Cactaceae**: *Cereus peruvianus, Lobivia* sp. **Cactaceae**: *Opuntia* sp. **Crassulaceae**: *Crassula* sp. **Ebenaceae**: *Diospyros kaki*. **Euphorbiaceae**: *Jatropha* sp. **Fabaceae**: *Ceratonia siliqua*. **Lauraceae**: *Persea americana*. **Liliaceae**: *Asparagus* sp. **Oleaceae**: *Jasminum mesnyi*. **Pittosporaceae**: *Pittosporum tobira*. **Proteaceae**: *Protea* sp. **Proteaceae**: *Leucadendron* sp., *Leucospermum* sp.

Acanthomytilus intermittens (Hall)
Poaceae: *Imperata cylindrical*.

Aonidia lauri (Bouché)
Lauraceae: *Laurus nobilis*.

Aonidiella aurantii (Maskell)
Anacardiaceae: *Mangifera indica, Pistacia lentiscus*. **Caprifoliaceae**: *Viburnum tinus*. **Celastraceae**: *Euonymus* sp. **Cucurbitaceae**: *Cucurbita* sp. **Cycadaceae**: *Cycas* sp., *C. revolute*. **Oleaceae**: *Olea europaea*. **Rosaceae**: *Amygdalus communis, Malus* sp., *Rosa* sp. **Rutaceae**: *Citrus aurantium, C. grandis, C. limon, C. paradisi, C. reticulata*. **Salicaceae**: *Populus* sp.

Aonidiella orientalis (Newstead)
Anacardiaceae: *Mangifera indica, Pistacia lentiscus*. **Apocynaceae**: *Nerium oleander.* **Celastraceae**: *Catha edulis*. **Fabaceae**: *Ceratonia siliqua*. **Moraceae**: *Ficus benghalensis*. **Punicaceae**: *Punica granatum*. **Rutaceae**: *Citrus grandis, C. paradisi*. **Sapotaceae**: *Achras sapota*.

****Aspidiotus hedericola*** Lindinger
Araliaceae: *Hedera helix.*

Aspidiotus nerii Bouché
Actinidiaceae: *Actinidia chinensis*. **Agavaceae**: *Yucca* sp. **Amaranthaceae**: *Amaranthus* sp. **Apocynaceae**: *Nerium oleander.* **Araliaceae**: *Hedera helix*. **Asteraceae**: *Chrysanthemum* sp, *Gazania* sp. **Buxaceae**: *Simmondsia chinensis*. **Capparidaceae**:

Capparis sp. **Caryophyllaceae**: *Dianthus* sp. **Cycadaceae**: *Cycas* sp, *C. revoluta*. **Cyperaceae**: *Cyperus flabelliformis*. **Elaeagnaceae**: *Elaeagnus angustifolia*. **Euphorbiaceae**: *Mercurialis annua, Ricinus communis*. **Fabaceae**: *Acacia cyanophylla, A. longifolia, Ceratonia siliqua, Spartium junceum*. **Haemodoraceae**: *Anigozanthos* sp. **Hemerocallidaceae**: *Phormium tenax*. **Liliaceae**: *Asparagus* sp, *A. variegates*. **Liliaceae**: *Aspidistra* sp. **Meliaceae**: *Melia azedarach*. **Moraceae**: *Ficus carica*. **Oleaceae**: *Olea europaea*. **Anacardiaceae**: *Pistacia atlantica, P. lentiscus*. **Pittosporaceae**: *Pittosporum undulatum*. **Proteaceae**: *Grevillea banksii, Leucodendron* sp., *Macadamia* sp., *Protea* sp. **Oleaceae**: *Olea europaea*. **Santalaceae**: *Osyris alba*. **Smilacaceae**: *Smilax* sp. **Solanaceae**: *Lycopersicon esculentum*. **Thymelaeaceae**: *Thymelaea hirsuta*.

Chionaspis etrusca Leonardi
Tamaricaceae: *Tamarix* sp.

Chionaspis lepineyi Balachowsky
Fagaceae: *Quercus calliprinos, Q. ithaburensis*.

Chortinaspis iridis Balachowsky
Iridaceae: *Iris* sp., + *I. nazarina*.

Chrysomphalus aonidum (Linnaeus)
Anacardiaceae: *Mangifera indica*. **Arecaceae**: *Phoenix dactylifera*. **Cycadaceae**: *Cycas* sp. **Lauraceae**: *Persea americana*. **Liliaceae**: *Dracaena* sp. **Musaceae**: *Musa* sp. **Myrtaceae**: *Eucalyptus* sp. **Rutaceae**: *Citrus aurantium*, *C. grandis, C. limon, C. paradisi*.

Chrysomphalus dictyospermi (Morgan)
Lauraceae: *Laurus nobilis*.

Contigaspis bilobis (Newstead)
Umbelliferae: *Foeniculum vulgare*.

Contigaspis zillae (Hall)
Asclepiadaceae: *Calotropis procera*. **Cactaceae**: undetermined species. **Resedaceae**: *Ochradenus baccatus*.

Diaspidiotus cecconii (Leonardi)
Liliaceae: *Asparagus aphyllus*.

Diaspidiotus distinctus (Leonardi)
Fagaceae: *Quercus* sp.

Diaspidiotus nitrariae (Marchal)
Zygophyllaceae: + *Nitraria tridentate*.

Diaspidiotus ostreaeformis **(Curtis)**
Juglandaceae: *Juglans* sp. **Rosaceae**: *Malus* sp.

Diaspidiotus pyri (Lichtenstein)
Fabaceae: *Ceratonia siliqua*.

Diaspidiotus roseni Danzig
Zygophyllaceae: *Nitraria retusa*.

Diaspidiotus zonatus (Frauenfeld)
Fabaceae: *Ceratonia siliqua*. **Fagaceae**: *Quercus calliprinos*.

Diaspis echinocacti (Bouché)
Cactaceae: *Opuntia*.

Diaspis syriaca Lindinger
Anacardiaceae: *Pistacia atlantica, P. palestina*.

Duplachionaspis berlesii (Leonardi)
Liliaceae: *Asparagus aphyllus*.

Duplachionaspis natalensis (Maskell)
Poaceae: *Arundo donax, Chloris gayana, Cymbopogon citratus, Erianthus* sp., *Phragmites australis, Saccharum ravennae*.

Dynaspidiotus britannicus (Newstead)
Fabaceae: *Ceratonia siliqua*.

Epidiaspis gennadii (Leonardi)
Anacardiaceae: *Pistacia atlantica, P. lentiscus, P. palestina*.

Fiorinia fioriniae (Targioni Tozzetti)
Lauraceae: *Persea americana*. **Liliaceae**: *Ruscus aculeata*.

Fulaspis bytinskii Balachowsky
Fabaceae: *Acacia tortilis*.

Gonaspidiotus minimus (Leonardi)
Fagaceae: *Quercus calliprinos, Q. ithaburensis*.

Hemiberlesia lataniae (Signoret)
Actinidiaceae: *Actinidia chinensis*. **Anacardiaceae**: *Mangifera indica*. **Apocynaceae**: *Plumeria* sp. **Araliaceae**: *Hedera helix, Schefflera* sp. **Arecaceae. Asteraceae**: + *Arctotis reviscapa, Inula viscosa*. **Bignoniaceae**: *Bignonia* sp., *Stenolobium alatum, Tecoma capensis*. **Cucurbitaceae**: *Cucurbita moschata*. **Elaeagnaceae**: *Elaeagnus angustifolia*. **Fabaceae**: *Acacia cyanophylla*. **Iridaceae**: *Ixia* sp. **Juglandaceae**: *Carya pecan*. **Lamiaceae**: *Salvia* sp. **Lauraceae**: *Persea americana*. **Malvaceae**: *Hibiscus* sp. **Meliaceae**: *Melia azedarach*. **Moraceae**: *Ficus carica, F. sycomorus*. **Musaceae**: *Musa* sp. **Myrtaceae**: *Eucalyptus* sp., *Psidium guajava*. **Oxalidaceae**: *Averrhoa carambola*. **Paeoniaceae**: *Paeonia* sp. **Pinaceae**: *Pinus eldarica*. **Primulaceae**: *Cyclamen persicum*. **Proteaceae**: *Grevillea* sp, *Macadamia* sp., *Protea* sp. **Rosaceae**: *Amygdalus communis, Cotoneaster pannosus, Pyrus communis, Rubus*

sp. **Rutaceae**: *Citrus* sp. **Sterculiaceae**: *Brachychiton* sp. **Strelitziaceae**: *Strelitzia* sp., *S. reginae*. **Thymelaeaceae**: *Thymelaea hirsuta*. **Vitaceae**: *Vitis vinifera*.

Hemiberlesia rapax (Comstock)
Actinidiaceae: *Actinidia chinensis*.

Lepidosaphes beckii (Newman)
Apocynaceae: *Nerium oleander.* **Rutaceae**: *Citrus aurantium, C. grandis, C. paradisi, C. reticulata, Murraya* sp.

Lepidosaphes conchiformis (Gmelin)
Elaeagnaceae: *Elaeagnus orientalis***. Moraceae**: *Ficus carica*. **Rhamnaceae**: *Ziziphus spina-christi*. **Salicaceae**: *Salix* sp.

Lepidosaphes flava (Signoret)
Oleaceae: *Olea europaea*.

Lepidosaphes ulmi (Linnaeus)
Fabaceae: *Spartium junceum*. **Salicaceae**: *Populus alba, P. chilensis , Salix* sp., *Salix babylonica*. **Styracaceae**: *Styrax officinalis*. **Vitaceae**: *Vitis vinifera*.

Leucaspis knemion Hoke
Pinaceae: *Pinus brutia*, *P. canariensis*, *P. halepensis*, *P. pinea*.

Leucaspis lowi Colvée
Pinus halepensis, P. maritima, P. pinea, P. radiata.

Leucaspis pusilla Loew
Pinaceae: *Pinus halepensis, P. brutia, P. canariensis, P. maritima, P. radiata*.

Leucaspis riccae Targioni Tozzetti
Oleaceae: *Olea europaea*.

Lineaspis striata (Newstead)
Cupressaceae: *Cupressus sempervirens*.

Melanaspis inopinata (Leonardi)
Anacardiaceae: *Pistacia palestina, P. terebinthus, P. vera, Rhus tripartita*. **Fagaceae**: *Quercus calliprinos, Q. ithaburensis*. **Rosaceae**: *Amygdalus communis*.

Mercetaspis bicuspis (Hall)
Tamaricaceae: *Tamarix* sp.

Mercetaspis halli (Green)
Rosaceae: *Amygdalus communis, Prunus armeniaca, P. domestica, P. persica*.

Mercetaspis isis (Hall)
Tamaricaceae: *Tamarix* sp.

Oceanaspidiotus spinosus (Comstock)
Actinidiaceae: *Actinidia chinensis*. **Celastraceae**: *Euonymus sp*. **Ebenaceae**: *Diospyros kaki*. **Salicaceae**: *Populus chilensis*.

Odonaspis panici Hall
Poaceae: *Panicum turgidum*.

Odonaspis ruthae Kotinsky
Poaceae: *Chloris gayana, Cynodon dactylon*.

Pallulaspis retamae (Hall)
Fabaceae: *Retama raetam*.

Parlatoria blanchardi (Targioni Tozzetti)
Arecaceae: *Hyphaene thebaica, Phoenix dactylifera*.

Parlatoria cinerea Hadden
Rutaceae: *Citrus aurantium, C. grandis, C. paradisi, C. reticulata*.

Parlatoria oleae (Colvée)
Anacardiaceae: *Pistacia vera*. **Apocynaceae**: *Nerium oleander*. **Ebenaceae**: *Diospyros kaki*. **Oleaceae**: *Olea europaea*. **Rosaceae**: *Amygdalus communis, Malus domestica, Prunus armeniaca, P. domestica, Pyrus malus, Rosa* sp.

Parlatoria pergandii Comstock
Rutaceae: *Citrus aurantium, C. limon, C. paradisi*.

Prodiaspis tamaricicola (Malenotti)
Tamaricaceae: *Tamarix* sp.

Pseudotargionia glandulosa (Newstead)
Fabaceae: *Acacia radianna*.

Rhizaspidiotus canariensis (Lindinger)
Asteraceae: *Achillea* sp., *Artemisia judaica*.

Rungaspis capparidis (Bodenheimer)
Capparidaceae: *Capparis cartilaginea*. **Fabaceae**: *Colutea istria*. **Malvaceae**: *Abutilon* sp. **Zygophyllaceae**: *Zygophyllum dumosum*.

Rungaspis macrolobis Kaussari
Chenopodiaceae: *Arthrocnemum macrostachyum, Suaeda* sp.

Salicicola kermanensis (Lindinger)
Salicaceae: *Populus alba*.

Salicicola pistaciae (Lindinger)
Anacardiaceae: *Pistacia lentiscus*.

Targionia nigra Signoret
Asteraceae: *Artemisia judaica*. **Thymelaeaceae**: *Thymelaea hirsuta*.

Targionia vitis (Signoret)
Fagaceae: *Quercus calliprinos, Quercus* sp.

ERIOCOCCIDAE

Acanthococcus araucariae (Maskell)
Araucariaceae: *Araucaria* sp.

Acanthococcus coccineus (Cockerell)
Cactaceae: *Cereus* sp., *C. silvestris, Echinocactus texensis*.

Eriococcus thymelaeae Newstead
Thymelaeaceae: *Thymelaea hirsuta*.

****Ovaticoccus agavium*** (Douglas)
Agavaceae: *Agave* sp.

KERMESIDAE

Kermes biblicus (Bodenheimer)
Fagaceae: *Quercus coccifera*.

Kermes bytinskii Sternlicht
Fagaceae: *Quercus ithaburensis*.

Kermes echinatus Balachowsky
Fagaceae: *Quercus coccifera*.

Kermes greeni Bodenheimer
Fagaceae: *Quercus coccifera*.

Kermes nahalali Bodenheimer
Fagaceae: *Quercus coccifera*.

Kermes palestiniensis Balachowsky
Fagaceae: *Quercus coccifera*.

Kermes spatulatus Balachowsky
Fagaceae: *Quercus ithaburensis*.

Nidularia balachowskii Bodenheimer
Fagaceae: *Quercus ithaburensis*.

LECANODIASPIDIDAE

Lecanodiaspis africana (Newstead)
Fabaceae: *Acacia* sp., *A. radianna, A. tortilis*. **Moraceae**: *Ficus carica, F. rubiginosa*. **Rhamnaceae**: *Ziziphus spina-christi*.

Lecanodiaspis sardoa Targioni Tozzetti
Cistaceae: *Cistus* sp., *Helianthemum ellipticum*.

MATSUCOCCIDAE

Matsucoccus josephi Bodenheimer & Harpaz
Pinaceae: *Pinus brutia, P. canariensis, P. eldarica, P. halepensis*.

MICROCOCCIDAE

Micrococcus bodenheimeri Bytinskii-Salz
Poaceae: *Avena* sp., *A. sterilis, Cynodon dactylon, Lolium* sp., *Stipa* sp., *Triticum vulgare*.

MONOPHLEBIDAE

Gueriniella serratulae (Fabricius)
Asteraceae: *Artemisia monosperma, Carduus argentatus, Carlina* sp., *Centaurea* sp., *C. eringioides, Varthemia iphionoides*. **Fabaceae**: *Spartium junceum*. **Fagaceae**: *Quercus ithaburensis*. **Lamiaceae**: *Salvia* sp., *S. judaica*. **Umbelliferae**: *Artedia* sp. *Foeniculum vulgare*. **Pinaceae**: *Pinus canariensis, P. halepensis*. **Rosaceae**: *Sarcopoterium spinosum*.

****Icerya aegyptiaca*** (Douglas)
Lamiaceae: *Coleus* sp. **Magnoliaceae**: *Magnolia grandiflora*. **Moraceae**: *Ficus nitida, F. sycomorus*.

Icerya purchasi Maskell
Asteraceae: *Artemisia monosperma, Erigeron* sp. **Fabaceae**: *Prosopis farcta*. **Lamiaceae**: *Rosmarinus officinalis, Salvia* sp. **Myrtaceae**: *Psidium guajava*. **Rosaceae**: *Rosa* sp. **Rutaceae**: *Citrus aurantium, C. limon, C. grandis, C. reticulata*.

Palaeococcus fuscipennis (Burmeister)
Pinaceae: *Pinus brutia, P. canariensis, P. halepensis, P. pinea*.

PHOENICOCOCCIDAE

Phoenicococcus marlatti Cockerell
Arecaceae: *Phoenix dactylifera*.

PSEUDOCOCCIDAE

Antonina graminis (Maskell)
Poaceae: *Chloris gayana, Cynodon dactylon, C. transvaalensis*.

Antonina panica Hall
Poaceae: *Panicum turgidum*.

Asphodelococcus asphodeli (Bodenheimer)
Liliaceae: *Asphodelus macrocarpus, A. microcarpus*.

Brevennia rehi (Lindinger)
Poaceae: *Cynodon dactylon, Dactyloctenium australe*.

Ceroputo pilosellae Šulc
Rosaceae: *Poterium spinosum*.

Chaetococcus phragmitis (Marchal)
Poaceae: *Phragmites australis*.

Dysmicoccus brevipes (Cockerell)
Arecaceae: *Cocos nucifera, C. plumosa, Phoenix dactylifera*. **Asclepiadaceae**: *Araujia sericofera*. **Bromeliaceae**: *Ananas comosus*. **Lauraceae**: *Persea americana*. **Cyperaceae**: *Cyperus rotundus*. **Poaceae**: *Saccharum officinarum*. **Rutaceae**: *Murraya* sp. **Rosaceae**: *Prunus armeniaca*. **Zingiberaceae**: *Curcuma* sp.

Dysmicoccus trispinosus (Hall)
Poaceae: *Eragrostis minor.*

Eurycoccus sternlichti Williams
Fagaceae: *Quercus ithaburensis*.

Ferrisia malvastra (McDaniel)
Apocynaceae: *Nerium oleander.* **Asclepiadaceae**: *Calotropis procera*. **Asteraceae**: *Artemisia dracunculus, Erigeron* sp., *Solidago* sp., *Tagetes* sp. **Boraginaceae**: *Echium angustifolium*. **Brassicaceae**: *Brassica rapa*. **Cactaceae**: *Epiphyllum* sp., *Hylocereus polyrhizus, Lobivia* sp., *Rebutia* sp. **Chenopodiaceae**: *Beta vulgaris, Chenopodium mariana, Kochia* sp., *Suaeda monoica*. **Convolvulaceae**: *Cressa cretica*. **Fabaceae**: *Acacia negevensis, Albizia julibrissin, Phaseolus vulgaris*. **Lamiaceae**: *Mentha* sp. **Liliaceae**: *Ruscus* sp. **Lauraceae**: *Persea americana*. **Malvaceae**: *Gossypium hirsutum, Malva* sp. **Myrtaceae**: *Chamelaucium uncinatum*. **Onagraceae**: *Oenothera drummondii*. **Proteaceae**: *Macadamia* sp. **Scrophulariaceae**: *Leucophyllum* sp**.** **Solanaceae**: *Solanum luteum, S. tuberosum*. **Verbenaceae**: *Avicennia marina*.

Formicococcus lindingeri (Bodenheimer)
Anacardiaceae: *Mangifera indica*. **Arecaceae**: *Phoenix canariensis, Washingtonia* sp. **Lauraceae**: *Persea americana*.

Kiritshenkella sacchari (Green)
Poaceae: *Arundo, Desmostachia bipinnata*.

Lacombia dactyloni (Bodenheimer)
Asteraceae: *Artemisia herba-alba*. **Poaceae**: *Cynodon dactylon*.

Mirococcus inermis (Hall)
Rosaceae: *Neurada procumbens*.

Misericoccus imperatae (Hall)
Poaceae: *Cynodon dactylon*.

Nipaecoccus viridis (Newstead)
Araliaceae: *Schefflera* sp. **Liliaceae**: *Asparagus* sp. **Rutaceae**: *Citrus grandis, C. aurantium, C. limon, C. paradisi*.

Peliococcopsis priesneri (Laing)
Poaceae: *Cynodon dactylon*.

Peliococcus daganiae (Bodenheimer)
Poaceae: *Cynodon dactylon*.

Peliococcus deserticola Ben-Dov & Gerson
Anacardiaceae: *Rhus tripartita*. **Boraginaceae**: *Onosma* sp.

Phenacoccus alonim Ben-Dov
Fagaceae: *Quercus ithaburensis*.

Phenacoccus avenae Borchsenius
Amaryllidaceae: *Pancratium* sp. **Liliaceae**: *Urginea maritima*. **Poaceae**: *Cynodon dactylon*.

****Phenacoccus emansor*** Williams & Kozarzhevskaya
Iridaceae: *Gladiolus* sp., *Iris* sp.

Phenacoccus parvus Morrison
Asteraceae: *Wedelia trilobata*. **Solanaceae**: *Cestrum nocturnum*. **Verbenaceae**: *Lantana camara*.

Phenacoccus solani Ferris
Acanthaceae: *Dicliptera* sp. **Amaryllidaceae**: *Hippeastrum* sp. **Asteraceae**: *Artemisia dracunculus, Conyza* sp. **Cyperaceae**: *Cyperus rotundus*. **Liliaceae**: *Ornithogalum dubium*. **Malvaceae**: *Malva* sp. **Solanaceae**: *Capsicum annuum, Cestrum nocturnum, Nicotiana benthamiana, Physalis* sp., *Solanum tuberosum*. **Violaceae**: *Viola tricolour.*

Phenacoccus yerushalmi Ben-Dov
Pinaceae: *Pinus halepensis*.

Planococcus citri (Risso)
Aizoaceae: *Faucaria tigrina*. **Amaryllidaceae**: *Hippeastrum* sp. **Anacardiaceae**: *Mangifera indica*. **Annonaceae**: *Annona squamosa*. **Apocynaceae**: *Nerium oleander.* **Araceae**: *Anthurium* sp., *Dieffenbachia* sp., *Philodendron* sp., *Photos* sp. **Araliaceae**: *Aralia elegantissima, Schefflera* sp. **Arecaceae**: *Phoenix dactylifera*. **Asclepiadaceae**: *Asclepias* sp. **Asteraceae**: *Aster* sp.**,** *Helianthus* sp., *Tagetes* sp. **Balsaminaceae**: *Impatiens* sp. **Cactaceae**: *Cereus* sp., *Opuntia* sp. **Celastraceae**: *Euonymus* sp. **Chenopodiaceae**: *Beta vulgaris*. **Crassulaceae**: *Kalanchoe* sp., *Sedum* sp. **Cucurbitaceae**: *Cucurbita moschata*. *Ecballium elaterium*. **Ebenaceae**: *Diospyros kaki*. **Euphorbiaceae**: *Croton* sp., *Jatropha curcas*. **Fabaceae**: *Arachis hypogaea, Ceratonia siliqua, Erythrina caffra, Glycyrrhiza glabra, Glycine max*. **Gesneriaceae**: *Saintpaulia sp*. **Iridaceae**: *Iris* sp. **Lamiaceae**: *Coleus* sp., *Mentha* sp., *Physostegia* sp., *Rosmarinus officinalis*. **Lauraceae**: *Persea americana*. **Malvaceae**: *Gossypium hirsutum*. **Moraceae**: *Ficus carica, F. nitida, Morus alba*. **Musaceae**:

Musa sp. **Myrtaceae**: *Myrtus communis, Psidium guajava, Syzygium* sp. **Oleaceae**: *Olea europaea*. **Polygonaceae**: *Polygonum acuminatum, P. equisetiforme*. **Punicaceae**: *Punica granatum*. **Rhamnaceae**: *Ziziphus spina-christi*. **Rosaceae**: *Amygdalus communis*. **Ruscaceae**: *Ruscus aculeatus*. **Rutaceae**: *Citrus grandis, C. medica, C. paradisi,* **Sapindaceae**: *Alectryon tomentosus*. **Saxifragaceae**: *Ribes* sp. **Solanaceae**: *Duranta stramonium, Lycopersicum esculentum, Solanum muricatum, S. nigrum, S. tuberosum,* **Strelitziaceae**: *Strelitzia nicolai*. **Thymelaeaceae**: *Thymelaea hirsuta*. **Umbelliferae**: *Apium graveolens*. **Urticaceae**: *Parietaria* sp. **Violaceae**: *Viola africana*. **Vitaceae**: *Cissus* sp. **Zygophyllaceae**: *Balanites aegyptiaca*.

Planococcus ficus (Signoret)

Capparidaceae: *Capparis cartilaginea*. **Cistaceae**: *Cistus* sp. **Fabaceae**: *Prosopis farcta*. **Moraceae**: *Ficus carica, F. nitida*. **Oleaceae**: *Olea europaea*. **Punicaceae**: *Punica granatum*. **Rhamnaceae**: *Ziziphus spina-christi*. **Solanaceae**: *Solanum tuberosum*. **Tamaricaceae**: *Tamarix*. **Vitaceae**: *Vitis vinifera*.

Planococcus vovae (Nasonov)

Cupressaceae: *Cupressus* sp., *Cupressus macrocarpa, C. sempervirens, Juniperus* sp., *Juniperus thurifera*.

Pseudococcus cryptus Hempel

Apocynaceae: *Nerium oleander.* **Ebenaceae**: *Diospyros kaki*. **Lauraceae**: *Persea americana*. **Rutaceae**: *Citrus aurantium, C. grandis, C. limon, C. paradisi, C. reticulata*.

Pseudococcus longispinus (Targioni Tozzetti)

Apocynaceae: *Carissa grandiflora*. **Cucurbitaceae**: *Cucurbita moschata*. **Cycadaceae**: *Cycas* sp. **Hemerocallidaceae**: *Phormium tenax*. **Lauraceae**: *Persea americana*. **Liliaceae**: *Dracaena* sp., *Ruscus aculeatus*. **Moraceae**: *Ficus benghalensis, F. carica, F. nitida*. **Myoporaceae**: *Myoporum acuminatum*. **Myrtaceae**: *Myrtus communis, Psidium guajava*. **Pinaceae**: *Pinus eldarica, Pinus halepensis*. **Pittosporaceae**: *Pittosporum undulatum*. **Rutaceae**: *Citrus limon, C. paradisi, C. sinensis*.

Pseudococcus viburni (Signoret)

Anacardiaceae: *Pistacia palestina*. **Asclepiadaceae**: *Hoya carnosa*. **Asteraceae**: *Gynura aurantiaca*. **Buxaceae**: *Simmondsia chinensis*. **Caprifoliaceae**: *Viburnum tinus*. **Cyperaceae**: *Cyperus rotundus*. **Euphorbiaceae**: *Sapium* sp. **Fabaceae**: *Glycyrrhiza glabra*. **Iridaceae**: *Gladiolus* sp. **Lauraceae**: *Persea americana*. **Liliaceae**: *Dracaena* sp. **Myrtaceae**: *Psidium guajava*. **Oleaceae**: *Phillyrea media*. **Onagraceae**: *Fuchsia* sp. **Passifloraceae**: *Passiflora edulis*. **Pinaceae**: *Cedrus libanotica*. **Pittosporaceae**: *Pittosporum* sp. **Plumbaginaceae**: *Limonium*. **Punicaceae**: *Punica granatum*. **Rosaceae**: *Pyrus malus* **Solanaceae**: *Solanum tuberosum*.

Ripersiella palestineae Hambleton

Amaryllidaceae: *Sternbergia clusiana*. **Iridaceae**: *Iris* sp. *Iris vartanii*, **Liliaceae**: *Arum dioscoridis, A. palaestinum*. **Primulaceae**: *Cyclamen*.

Saccharicoccus sacchari (Cockerell)
Poaceae: *Saccharum officinarum*.

Trabutina mannipara (Hemprich & Ehrenberg)
Tamaricaceae: *Tamarix* sp.

Trabutina serpentina (Green)
Tamaricaceae: *Tamarix* sp.

Trionymus angustifrons Hall
Asteraceae: *Carthamus glaucus, C. tenuis, Echinops* sp., *E. viscosus*. **Boraginaceae**: *Echium* sp. **Lamiaceae**: *Salvia* sp. **Solanaceae**: *Solanum tuberosum.*

Trionymus internodii (Hall)
Asteraceae: *Lactuca sativa*. **Bromeliaceae**: *Ananas comosus*. **Poaceae**: *Cynodon dactylon, Saccharum officinarum, Sorghum halepense*.

Trionymus phragmitis (Hall)
Poaceae: *Phragmites australis*.

Vryburgia amaryllidis (Bouché)
Amaryllidaceae: *Hippeastrum* sp.

Vryburgia brevicruris (McKenzie)
Asclepiadaceae: *Stapelia hirsuta*.

PUTOIDAE

Puto israelensis Ben-Dov
Fagaceae: *Quercus calliprinos*.

ANNOTATIONS ON SPECIES

COCCIDAE

Ceroplastes actiniformis Green

Bodenheimer (1927) found this wax scale on introduced *Phoenix canariensis, Yucca whippleri* and *Pritchardia flifera* at the acclimatization garden in Tel Aviv. I have not collected it until the present, and assume that it has not been established in Israel.

Ceroplastes sinensis Del Guercio

Bodenheimer (1951: 387) reported that this species was intercepted in Palestine on introduced fruit trees from Italy. I have not collected it until the present and assume that the species have not established in Israel.

Eucalymnatus tessellates (Signoret)

Avidov and Ben-Haim (1950) listed a soft scale insect under this name, which was taken off mango and avocado at the Coastal Plain. The ICVI collection contains slides (collected in 1947 off mango at Nes-Ziyonah) which have been mis-identified by Bodenheimer as *Eucalymnatus tessellates*. I have identified these specimens as *Milviscutulus mangiferae*, *Eucalymnatus tessellates* was never found in Israel.

Table 1
Cumulative number of families and species of scale insects recorded in Israel from 1924 to 2010

	Bodenheimer 1924	Bodenheimer 1937	2010
Aclerdidae	–	–	2
Asterolecaniidae	4	4	5
Coccidae	10	22	35
Diaspididae	45	58	62
Eriococcidae	1	2	4
Kermesidae	1	3	8
Lecanodiaspididae	–	–	2
Matsucoccidae	–	–	1
Micrococcidae	–	–	1
Monophlebidae	2	3	4
Phoenicococcidae	1	1	1
Pseudococcidae	5	17	40
Putoidae	–	–	1
Total	69	110	166

Table 2
The diversity of scale insect species and families in 7 Mediterranean countries; based on ScaleNet (2010)

Country	Area in million km^2	# species	# families
Egypt	1.010	195	15
France	0.643	401	18
Greece	0.131	151	13
Israel	0.022	166	13
Italy	0.301	366	17
Spain	0.505	210	14
Turkey	0.783	284	14

DIASPIDIDAE

Aulacaspis rosae (Bouché)

Bodenheimer (1937) and Bytinski-Salz (1966) reported this species from Israel, but I did not record it.

Aulacaspis tubercularis (Newstead)

Borchsenius (1966) and Miller and Davidson (2005) listed Israel among the distribution record of this species. It was not found in Israel, and these records are questionable.

Diaspis fraxinicola Bodenheimer, 1930: 378, *Nomen Nudum*

The publication of this name by Bodenheimer (1930) included just the binomen, host plant, and locality; therefore, it is a *Nomen Nudum*.

Lepidosaphes gloverii (Packard)

Bodenheimer (1951b) recorded this species from Citrus in the early 1920s. It was not found again by him during a survey in 1934. I have not collected it until the present, and assume that it was not established in Israel.

Lepidosaphes malicola Borchsenius

Danzig and Pellizzari (1998) listed this species as occurring in Israel. Evelyna Danzig (personal communication, 2010) informed me that no material from Israel is available in the Coccoidea collection, Zoological Museum, St. Petersburg, Russia. I have not collected this armoured scale in Israel. Therefore, the above-mentioned record from Israel is doubtful.

Leucaspis pini (Hartig)

Gerson et al. (1976) did not find this species in Israel in the course of a survey of *Leucaspis* species on pine trees. The record under this name by Bodenheimer (1924: 56) was very likely a misidentification.

Parlatoria camelliae Comstock

Carmin (1950) studied, under this name, an armored scale insect on citrus in Israel. After examining the taxonomic illustration and considering the host plant in Carmin (1950), I regard Carmin's record from Israel a mis-identification of *Parlatoria pergandii* Comstock.

Parlatoria crotonis Douglas

Borchsenius (1966) and Danzig and Pellizzari (1998) listed this species as being distributed in Israel. Evelyna Danzig (personal communication, 2010) informed me that no material from Israel is available in the Coccoidea collection, Zoological Museum, St. Petersburg, Russia. I have not collected this armored scale in Israel. Therefore, the above-mentioned record from Israel is doubtful.

Parlatoria proteus (Curtis***)***

Merkel (1938: 98) listed this species as intercepted in Germany on apples imported from Palestine. Since then this species was not found in Israel, and it is assumed that Merkel (1938) record was a misidentification of *Parlatoria oleae*.

Parlatoria ziziphi (Lucas***)***

The distribution record from Israel of this species by Blackburn and Miller (1984) was based on an erroneous quarantine report from the USA. A passenger on an Israeli airline carrying an infested orange was quarantined, but the orange most likely came from another Mediterranean country. I have not collected this species until now in Israel.

Pinnaspis aspidistrae (Signoret***)***

Bodenheimer (1924) recorded this species only once off a Liliaceae plant at Tel Aviv. I have not collected it until the present, and assume that it has not been established in Israel.

Pseudaulacaspis pentagona (Targioni Tozzetti***)***

Bytinski-Salz (1966) reported that this species has been inadvertently introduced into Israel with poplar saplings, but was successfully eradicated during 1958. I have not collected it until the present, and assume that it has not been established in Israel.

Unaspis euonymi (Comstock***)***

Bodenheimer (1927: 177) reported on heavy infestation of this species on *Euonymus japonicas* in Tel Aviv. Since 1927 to the present this armored scale insect was not found in Israel. It is very likely that it did not establish in the country.

ERIOCOCCIDAE

Eriococcus devoniensis (Green***)***

Köhler (1998) listed this species as distributed in Israel. This record is regarded as doubtful because no material or publication source is available.

Eriococcus thymi (Schrank***)***

Köhler (1998) listed this species as distributed in Israel. This record is regarded as doubtful because no material or publication source is available.

ZOOGEOGRAPHICAL CONSIDERATIONS

A total of 166 species of scale insects belonging to 12 families have been known since 2010 to occur in Israel, as summarized in Table 1. The most species-rich families are the Diaspididae, with 62 species; the Pseudococcidae, with 41 species; and the soft scale

family, Coccidae, with 35 species. This ratio of species diversity is similar to the rate among the total number of scale insect species in the world, as shown in ScaleNet (Ben-Dov and Miller, 2010).

Table 2 presents a comparison in the diversity of Coccoidea taxa in Israel with six Mediterranean countries in which the scale insect fauna was intensively studied. It appears that whereas the area size of Israel is small, the richness of scale insect taxa is comparatively high.

The scale insect species in the fauna of Israel are listed here among five groups, according to the current, recorded distribution of each species in the zoogeographical regions of the world:

1. Indigenous—Middle-Eastern. These are species that are known so far only from Israel and contiguous territories. The group includes 24 species, 14.4%.

Anapulvinaria pistaciae
Bodenheimera rachelae
Chortinaspis iridis
Coccus elatensis
Diaspidiotus roseni
Dysmicoccus trispinosus
Eurycoccus sternlichti
Exaeretopus harpazi
Formicococcus lindingeri
Fulaspis bytinskii
Kenima galilit
Kermes biblicus
Kermes bytinskii
Kermes echinatus
Kermes greeni
Kermes nahalali
Kermes palestiniensis
Kermes spatulatus
Matsucoccus josephi
Micrococcus bodenheimeri
Peliococcus deserticola
Phenacoccus alonim
Puto israelensis
Ripersiella palestineae

The seven species of *Kermes,* which were described, and so far are known only from Israel, are currently under study. Therefore, it is too early to comment on their zoogeographical relationships.

2. Afrotropical. These species are probably of Afrotropical origin, and Israel is likely at their most northern extension of distribution. Ten species belong to this group, constituting 6.1% of the total.

Aclerda panica
Antonina panica
Contigaspis zillae
Lecanodiaspis africana
Odonaspis panici
Palmaspis phoenicis
Pseudotargionia glandulosa
Saissetia privigna
Waxiella mimosae
Waxiella tamaricis

3. Mediterranean. The 22 species (13.3% of the total) in this group are widely distributed in the Mediterranean region.

Acantholecanium haloxyloni
Asphodelococcus asphodeli
Lecanodiaspis sardoa
Melanaspis inopinata

Aspidiotus hedericola
Contigaspis bilobis
Diaspidiotus nitrariae
Diaspis syriaca
Epidiaspis gennadii
Eriococcus thymelaeae
Filippia follicularis
Gueriniella serratulae
Lacombia dactyloni
Misericoccus imperatae
Pallulaspis retamae
Phenacoccus yerushalmi
Rhizaspidiotus canariensis
Stotzia ephedrae
Trionymus angustifrons
Trionymus angustifrons
Trionymus internodii
Trionymus phragmitis

4. Palearctic. This group comprises 40 species (24.1%), that have been recorded from Palearctic territories north to Israel.

Acanthomytilus intermittens
Acanthopulvinaria orientalis
Aonidia lauri
Chionaspis lepineyi
Diaspidiotus cecconii
Diaspidiotus distinctus
Diaspidiotus pyri
Diaspidiotus zonatus
Duplachionaspis berlesii
Eriopeltis festucae
Eriopeltis lichtensteini
Gonaspidiotus minimus
Lepidosaphes flava
Leucaspis knemion
Leucaspis lowi
Leucaspis pusilla
Leucaspis riccae
Lichtensia viburni
Lineaspis striata
Trabutina serpentina
Mercetaspis bicuspis
Mercetaspis halli
Mercetaspis isis
Mirococcus inermis
Palaeococcus fuscipennis
Palaeolecanium bituberculatum
Peliococcopsis priesneri
Peliococcus daganiae
Phenacoccus emansor
Prodiaspis tamaricicola
Puto pilosellae
Rhizopulvinaria artemisiae
Rungaspis macrolobis
Salicicola kermanensis
Salicicola pistaciae
Sphaerolecanium prunastri
Targionia nigra
Targionia vitis
Trabutina mannipara

5. Cosmopolitan. This group includes almost half of the total of scale insect species (70 species 42.1%) of Israel. Some of these species are destructive pests to agricultural crops.

Abgrallaspis cyanophylli
Acanthococcus araucariae
Acanthococcus coccineus
Aclerda phragmitis
Antonina graminis
Aonidiella aurantii
Aonidiella orientalis
Lepidosaphes conchiformis
Lepidosaphes ulmi
Milviscutulus mangiferae
Nipaecoccus viridis
Oceanaspidiotus spinosus
Odonaspis ruthae
Ovaticoccus agavium

Aspidiotus nerii
Asterodiaspis variolosa
Bambusaspis bambusae
Brevennia rehi
Carulaspis minima
Ceroplastes floridensis
Ceroplastes rusci
Chaetococcus phragmitis
Chionaspis etrusca
Chrysomphalus aonidum
Chrysomphalus dictyospermi
Coccus capparidis
Coccus hesperidum
Coccus longulus
Coccus pseudomagnoliarum
Diaspidiotus ostreaeformis
Diaspis echinocacti
Duplachionaspis natalensis
Dynaspidiotus britannicus
Dysmicoccus brevipes
Ferrisia malvastra
Fiorinia fioriniae
Hemiberlesia lataniae
Hemiberlesia rapax
Icerya aegyptiaca
Icerya purchasi
Kiritshenkella sacchari
Lepidosaphes beckii
Parasaissetia nigra
Parlatoria blanchardi
Parlatoria cinerea
Parlatoria oleae
Parlatoria pergandii
Parthenolecanium corni
Parthenolecanium persicae
Phenacoccus parvus
Phenacoccus solani
Phoenicococcus marlatti
Planococcus citri
Planococcus ficus
Planococcus vovae
Pollinia pollini
Protopulvinaria pyriformis
Pseudococcus cryptus
Pseudococcus longispinus
Pseudococcus viburni
Pulvinaria psidii
Pulvinaria urbicola
Pulvinaria vitis
Pulvinariella mesembryanthemi
Russellaspis pustulans
Saccharicoccus sacchari
Saissetia coffeae
Saissetia oleae
Vryburgia amaryllidis
Vryburgia brevicruris

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