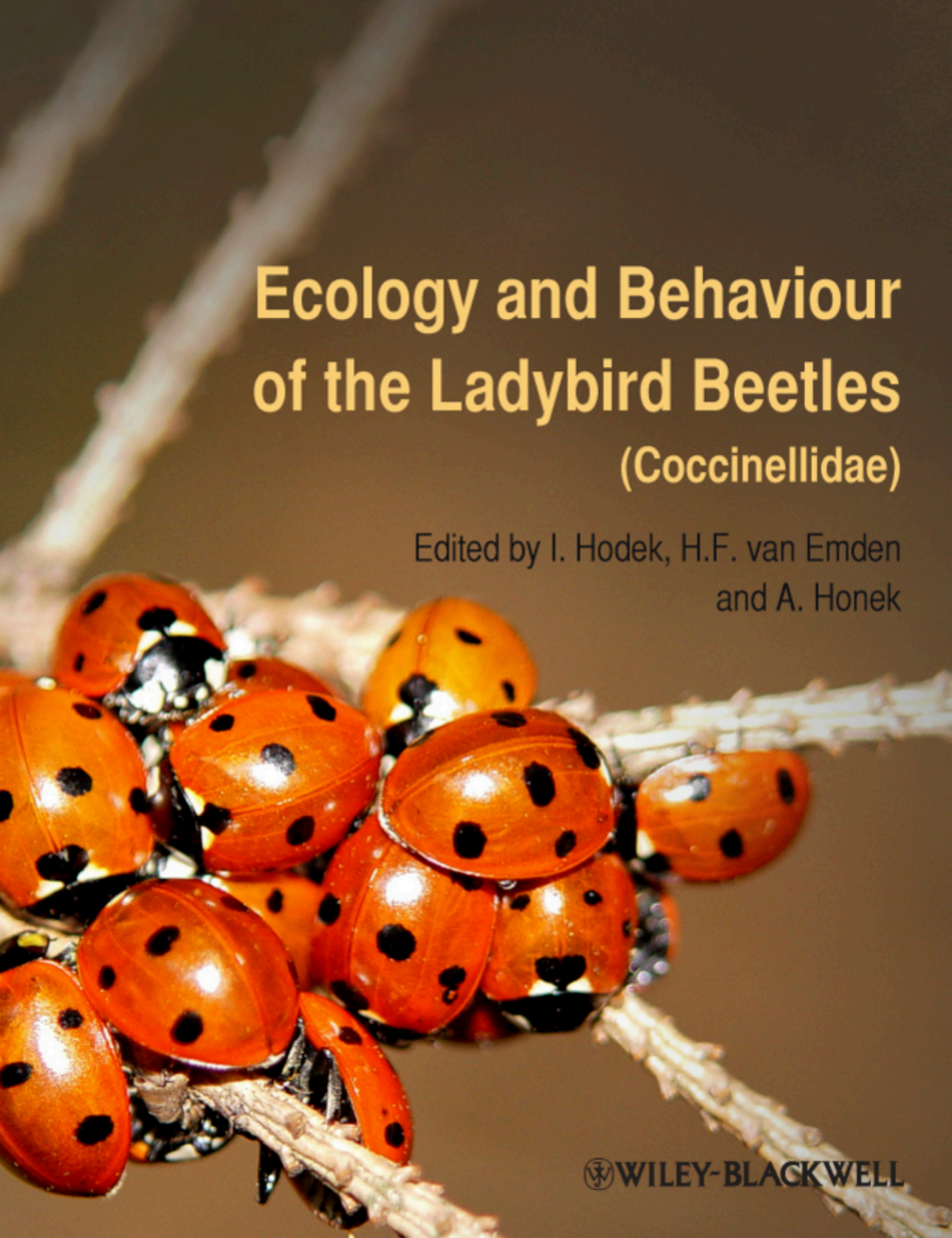
Ecology and Behaviour of the Ladybird Beetles (Coccinellidae)

Edited by I. Hodek, H.F. van Emden and A. Honek



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ECOLOGY AND BEHAVIOUR OF THE LADYBIRD BEETLES (COCCINELLIDAE)

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Edited by I. Hodek, H.F. van Emden and A. Honěk

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To all those scientists
who have now passed on
and who laid the foundation
of our present knowledge of Coccinellidae,
particularly to Michael Majerus
who intended to be one of authors
of this volume.

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Jan Pettersson

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PREFACE

For more than a decade, no volume on the general aspects of ladybirds has been published, although the predaceous major part of this coleopteran family represents an important component of the natural enemies of Sternorrhyncha (aphids, coccids, aleyrodids and psyllids). These sucking insects are among the most dangerous pests of crops, as under suitable conditions their populations increase exponentially, especially when parthenogenesis and viviparity occur.

Although classical biological control with coccinellids has recently been mostly abandoned, the increasing concern about chemical pest control has increased the need for modern types of biological control, mostly involving conservation and augmentation, within the framework of integrated pest management. For the success of these sophisticated methods of control, precise knowledge of behaviour and ecological relations is indispensable.

Such knowledge, particularly in the areas of ethology and molecular genetics, has accumulated in the last decade and reviewing these areas is an important novel contribution of this book. We hope that, at this stage, it will help to improve conservation and augmentation control, but also that it will stimulate further research.

The book was very unfortunately interrupted by the premature death of Professor Michael Majerus, Department of Genetics, Cambridge University, who was our proposed author for Chapters 2 and 8. We were extremely lucky to find very able successors, John Sloggett (Chapter 2), and Helen Roy and Remy Poland (for parasites and pathogens in Chapter 8), who fulfilled their task with great success. Many thanks !

We should like to thank the other authors of chapters for contributing their expertise so readily and for reacting so positively and constructively to our suggestions for revision. We are also grateful for the expert help we have received with taxonomic nomenclature: Dr O. Nedvěd of the University of South Bohemia, Czech Republic, and from the UK Drs V.F. Eastop, C.H. Lyal and D.J. Williams (Natural History Museum), Drs R.T.V. Fox and S.L.Jury (University of Reading) and Professor D.L.J. Quicke (Imperial College). Dr Lyal deserves additional thanks for his advice in relation to Chapter 1.

We should also like to thank Dr Ward Cooper of Wiley-Blackwell for enthusiastically agreeing to publish our book and Mr Kelvin Matthews for his help with the publication process. We should also like to thank the other Wiley-Blackwell staff who have worked so helpfully and efficiently on the production of this book.

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Reading, UK

Alois Honěk
Prague, Czech Republic

March 2012

INTRODUCTION

The reader may find the following information helpful in order to use the book more easily.

To keep the flow of the text unbroken and to save repetition and space, taxonomic affiliations of organisms and species authorities are given only in the Taxonomic Glossary (following section, while the Subject Index is at the end of book, as usual). Readers should also note that the Latin names as given in this glossary are used in the text and tables, and therefore may not be the same as the older Latin names given in the original papers cited. However, because the species names have usually not changed, and the older names are also listed in the glossary, any confusion will be avoided.

The very common generic names are always abbreviated as follows throughout the text of all chapters: *A.* for *Adalia*; *C.*, *Coccinella*; *Cer.*, *Ceratomegilla*; *Chil.*, *Chilocorus*; *Col.*, *Coleomegilla*; *Har.*, *Harmonia*; *Hip.*, *Hippodamia*; *P.*, *Propylea*.

Some phenomena are discussed in more than one chapter in the book, but from different angles; the reader's attention is directed to this by cross-references to the section number.

TAXONOMIC GLOSSARY

With common names where appropriate

Coleoptera: Family Coccinellidae

Synonyms [in square brackets] as well as currently valid names are listed in alphabetical order.

Adalia bipunctata (L.) – two spot ladybird [*Adalia fasciatopunctata* (Faldermann)]
Adalia conglomerata (L.)
Adalia decempunctata (L.) – ten spot ladybird
Adalia deficiens Mulsant
[*Adalia fasciatopunctata* (Faldermann)] = *Adalia bipunctata* (L.)
[*Adalia flavomaculata* (De Geer)] = *Lioadalia flavomaculata* (De Geer)
Adalia tetraspilota (Hope)
[*Adonia*] = *Hippodamia*
[*Adonia arctica* (Schneider)] = *Hippodamia arctica* (Schneider)
[*Adonia variegata* (Goeze)] = *Hippodamia variegata* (Goeze)
Afidenta misera (Weise) [*Afidenta mimetica* Dieke]
Aphidentula bisquadripunctata (Gyllenhal) [*Epilachna bisquadripunctata* (Gyllenhal)]
Afissula rana Kapur
Afissula sanscrita (Crotch)
Aiolocaria hexaspilota (Hope) [*Aiolocaria mirabilis* (Motschulsky)]
[*Aiolocaria mirabilis* (Motschulsky)] = *Aiolocaria hexaspilota* (Hope)
Alloneda dodecaspilota (Hope)
Anatis halonis Lewis
Anatis labiculata (Say) – fifteen spotted lady beetle
Anatis mali (Say) – eyespotted lady beetle
Anatis ocellata (L.) – eyed ladybird
Anatis quindecimpunctata (DeGeer)
Anegleis cardoni (Weise)
[*Anisolemnia dilatata* (F.)] = *Megalocaria dilatata* (F.)
Anisolemnia tetrasticta Fairmaire
Anisosticta bitriangularis (Say)
Anisosticta novemdecimpunctata (L.) – water ladybird
Anisosticta sibirica Bielawski
Aphidecta obliterata (L.) – larch ladybird
Apolinus lividigaster (Mulsant) [*Scymnodes lividigaster* (Mulsant)]
Axinoscymnus cardilobus Ren & Pang
[*Azya trinitatis* (Marshall)] = *Pseudoazya trinitatis* (Marshall)
Azya orbigera Mulsant
Brachiacantha quadripunctata Melsheimer
Brachiacantha ursina (F.)
Brumoides septentrionis (Weise)
Brumoides suturalis (F.) – three-striped lady beetle [*Brumus suturalis* (Mani)]
[*Brumus quadripustulatus* (L.)] = *Exochomus quadripustulatus* (L.)
[*Brumus suturalis* (Mani)] = *Brumoides suturalis* (F.)
Bulaea lichatschovi (Hummel)
Callicaria superba (Mulsant)
Calvia albida Bielawski
Calvia decemguttata (L.)
Calvia duodecimmaculata Gebler
Calvia muiri Timberlake [*Eocaria muiri* Timberlake]
Calvia quatuordecimguttata (L.) – cream-spot ladybird
Calvia quindecimguttata (F.)
Calvia shiva Kapur
Calvia shiva pasupati Kapur
Calvia shiva pinaki Kapur
Calvia shiva trilochana Kapur
Ceratomegilla barovskii kiritschenkoi (Semenov-Tian-Shanski) [*Spiladelpha barovskii kiritschenkoi* Semenov-Tian-Shanski]

Ceratomegilla notata (Laicharting)
Ceratomegilla undecimnotata (Schneider) [*Semiadalia undecimnotata* (Schneider)]
Cheilomenes lunata (F.)
Cheilomenes propinqua vicina (Mulsant) [*Cheilomenes vicina* (Mulsant), *Cydonia vicina nilotica* Mulsant]
[*Cheilomenes sexmaculata* (F.)] = *Menochilus sexmaculatus* (F.)
Cheilomenes sulphurea (Olivier)
[*Cheilomenes vicina*] = *Cheilomenes propinqua vicina* (Mulsant)
[*Chilocorus baylei* (Blackburn)] = *Chilocorus malasiae* Crotch
Chilocorus bijugus Mulsant
Chilocorus bipustulatus (L.) – heather ladybird
Chilocorus braeti Weise
Chilocorus cacti (L.)
Chilocorus circumdatus (Gyllenhal)
Chilocorus discoideus Crotch
Chilocorus distigma Klug
Chilocorus geminus Zaslavsky
Chilocorus hauseri Weise
Chilocorus hexacyclus Smith
Chilocorus infernalis Mulsant
Chilocorus inornatus Weise
Chilocorus kuwanae Silvestri
Chilocorus malasiae Crotch [*Chilocorus baylei* (Blackburn)]
Chilocorus nigripes Mader
Chilocorus nigritus (F.)
Chilocorus orbus Casey
Chilocorus quadrimaculatus (Weise)
Chilocorus renipustulatus (Scriba) – kidney-spot ladybird
Chilocorus rubidus Hope
Chilocorus similis (Rossi)
Chilocorus stigma (Say) – twice-stabbed lady beetle
Chilocorus tricyclus Smith
Chnootriba similis (Thunberg)
Cleobora mellyi (Mulsant) – Tasmanian ladybird
Clitostethus arcuatus (Rossi)
Clitostethus oculatus (Blatchley) [*Nephaspis oculatus* (Blatchley)]
Coccidophilus citricola Brèthes
Coccidula rufa (Herbst)
Coccidula scutellata (Herbst)
[*Coccinella algerica* Kovář] = *Coccinella septempunctata algerica* Kovář
Coccinella californica Mannerheim
Coccinella explanata Miyatake
Coccinella hieroglyphica L. – hieroglyphic ladybird
Coccinella leonina transversalis F. [*Coccinella repanda* Thunberg, *Coccinella transversalis* F.]
Coccinella luteopicta (Mulsant)
Coccinella magnifica Redtenbacher – scarce seven spot ladybird [*Coccinella divaricata* Olivier)]
Coccinella monticola Mulsant
Coccinella nigrovittata Kapur [*Tytthaspis trilineata* (Weise)]
Coccinella novemnotata Herbst – nine-spotted lady beetle
Coccinella quinquepunctata L. – five spot ladybird
Coccinella reitteri Weise
[*Coccinella repanda* Thunberg] = *Coccinella leonina* F.
Coccinella septempunctata L. – seven spot ladybird
Coccinella septempunctata algerica Kovář [*Coccinella algerica* Kovář]
Coccinella septempunctata brucki Mulsant
[*Coccinella sinuatomarginata* Faldermann] = *Coccinula sinuatomarginata* (Faldermann)
[*Coccinella transversalis* F.] = *Coccinella leonina transversalis* F.
Coccinella transversoguttata Faldermann – transverse lady beetle
Coccinella transversoguttata richardsoni Brown
Coccinella trifasciata L. – three-banded lady beetle
Coccinella undecimpunctata L. – eleven spot ladybird
[*Coccinella undecimpunctata aegyptiaca* Reiche] = *Coccinella undecimpunctata menetriesi* Mulsant
Coccinella undecimpunctata menetriesi Mulsant [*Coccinella undecimpunctata aegyptiaca* Reiche]
Coccinula crotchi (Lewis)
Coccinula quatuordecimpustulata (L.)
Coccinula redimita (Weise)
Coccinula sinensis (Weise)
Coccinula sinuatomarginata (Faldermann) [*Coccinella sinuatomarginata* Faldermann]
Coelophora biplagiata Swartz [*Lemnia biplagiata* (Swartz)]
Coelophora bissellata Mulsant
Coelophora duvaucelii (Mulsant)
Coelophora inaequalis (F.) – common Australian lady beetle
Coelophora mulsanti (Montrouzier)
Coelophora quadrivittata Fauvel
Coelophora saucia Mulsant
Coleomegilla maculata (DeGeer) – spotted lady beetle
Coleomegilla maculata fuscilabris (Mulsant)

Coleomegilla maculata lengi Timberlake – twelve spotted ladybeetle
Coleomegilla quadrifasciata (Schoenherr)
Cryptognatha simillima Sicard
Cryptognatha nodiceps Marshall
Cryptognatha signata Korschefsky
Cryptogonus ariasi (Mulsant)
Cryptogonus kapuri Ghorpade
Cryptogonus orbiculus (Gyllenhal)
Cryptogonus postmedialis Kapur
Cryptogonus quadriguttatus (Weise)
Cryptolaemus montrouzieri Mulsant – mealybug destroyer
Curinus coeruleus Mulsant – metallic blue lady beetle
Cycloneda ancoralis (Germar)
Cycloneda limbifer Casey
Cycloneda munda (Say) – polished lady beetle
Cycloneda polita Casey
Cycloneda sanguinea (L.) – blood-red lady beetle
[*Cydonia vicina nilotica* Mulsant] = *Cheilomenes propinqua vicina* (Mulsant)
Declivitata spp.
Delphastus catalinae (Horn)
Delphastus pusillus (LeConte)
Diomus austrinus Gordon
Diomus hennesseyi Fürsch
Diomus pumilio Weise
Diomus seminulus (Mulsant)
Diomus thoracicus F.
[*Eocaria muiri* Timberlake] = *Calvia muiri* (Timberlake)
Epilachna admirabilis Crotch
[*Epilachna bisquadripunctata* (Gyllenhal)] = *Aphidentula bisquadripunctata* (Gyllenhal)
[*Epilachna boisduvali* (Mulsant)] = *Henosepilachna boisduvali* Mulsant
Epilachna borealis (F.) – squash beetle
Epilachna canina (F.)
[*Epilachna 'chrysomelina'* (F.)]; used variably either for *Henosepilachna argus* (Geoffroy) or *Henosepilachna elaterii* (Rossi) or *Henosepilachna vigintioctopunctata* (F.)
[*Epilachna cucurbitae*] = *Henosepilachna sumbana* Bielawski
Epilachna defecta Mulsant
Epilachna dregei Mulsant – potato ladybird
Epilachna dumerili Mulsant
Epilachna eckloni Mulsant
[*Epilachna enneasticta* Mulsant] = *Henosepilachna enneasticta* (Mulsant)
Epilachna eusema (Weise)
Epilachna karisimbica Weise
Epilachna marginella (F.)
Epilachna marginicollis (Hope)
Epilachna mexicana (Guérin-Méneville)
Epilachna mystica Mulsant
Epilachna nigrolimbata Thomson
[*Epilachna niponica* Lewis] = *Henosepilachna niponica* (Lewis)
Epilachna paenulata (Germar)
[*Epilachna philippinensis* Dieke] = *Henosepilachna vigintisexpunctata* (Boisduval)
[*Epilachna pusillanima* Mulsant] = *Henosepilachna pusillanima* (Mulsant)
[*Epilachna pustulosa* Kôno] = *Henosepilachna pustulosa* (Kôno)
Epilachna quadricollis (Dieke)
[*Epilachna septima* Dieke] = *Henosepilachna septima* (Dieke)
[*Epilachna sparsa orientalis* Dieke] = *Henosepilachna vigintioctopunctata* (F.)
Epilachna undecimvariolata (Boisduval)
Epilachna varivestis Mulsant – mexican bean beetle
[*Epilachna vigintioctomaculata* Motschulsky] = *Henosepilachna vigintioctomaculata* (Motschulsky)
[*Epilachna vigintioctomaculata* Motschulsky] = *Henosepilachna vigintioctomaculata* (Motschulsky)
Epilachna vigintisexpunctata (Boisduval)
[*Epilachna yasutomii* (Katakura)] = *Henosepilachna yasutomii* Katakura
Epiverta chelonia (Mader)
Eriopis connexa (Germar)
Exochomus childreni Mulsant
[*Exochomus concavus* Fürsch] = *Parexochomus troberti concavus* (Fürsch)
Exochomus flavipes (Thunberg)
Exochomus flaviventris Mader
Exochomus fulvimanus Weise
[*Exochomus lituratus* (Gorham)] = *Priscibrumus lituratus* (Gorham)
[*Exochomus melanocephalus* (Zoubkoff)] = *Parexochomus melanocephalus* (Zoubkoff)
[*Exochomus nigromaculatus* (Goeze) = *Parexochomus nigromaculatus* (Goeze)
Exochomus quadripustulatus (L.) – pine ladybird [*Brumus quadripustulatus* (L.)]
[*Exochomus troberti* Mulsant] = *Parexochomus troberti* (Mulsant)
Halmus chalybeus (Boisduval) – steelblue lady beetle [*Orcus chalybeus* (Boisduval)]
[*Halyzia hauseri* (Mader)] = *Macroilleis hauseri* (Mader)

Halyzia sanscrita Mulsant
Halyzia sedecimguttata (L.) – orange ladybird
Halyzia straminea (Hope)
Halyzia tschitscherini Semenov
Harmonia antipoda (Mulsant in White) – antipodean ladybird
Harmonia axyridis (Pallas) – harlequin ladybird or Asian multi-colored ladybeetle
[*Harmonia breiti* Mader] = *Harmonia expalliata* Sicard
Harmonia conformis (Boisduval)
Harmonia dimidiata (F.) [*Leis dimidiata* (F.)]
Harmonia eucharis (Mulsant)
Harmonia expalliata Sicard [*Harmonia breiti* Mader]
Harmonia quadripunctata (Pontoppidan) – cream-streaked ladybird
Harmonia octomaculata (F.)
Harmonia sedecimnotata (F.)
Harmonia yedoensis (Takizawa)
Henosepilachna argus (Geoffroy) – bryony ladybird
Henosepilachna bifasciata (L.)
Henosepilachna boisduvali (Mulsant) [*Epilachna boisduvali* Mulsant]
Henosepilachna dodecastigma (Wiedemann)
Henosepilachna elaterii (Rossi) [*Epilachna chrysomelina* (F.)]
Henosepilachna enneasticta (Mulsant) [*Epilachna enneasticta* Mulsant]
Henosepilachna guttatopustulata (F.)
Henosepilachna indica (Mulsant)
Henosepilachna niponica (Lewis) [*Epilachna niponica* Lewis]
Henosepilachna ocellata (Redtenbacher)
Henosepilachna processa Li
Henosepilachna pusillanima (Mulsant) [*Epilachna pusillanima* Mulsant]
Henosepilachna pustulosa (Kôno) [*Epilachna pustulosa* Kôno]
Henosepilachna septima (Dieke) [*Epilachna septima* Dieke]
Henosepilachna sumbana Bielawski [*Epilachna cucurbitae* Richards, *Henosepilachna cucurbitae* Richards]
Henosepilachna vigintioctomaculata (Motschulsky) [*Epilachna vigintioctomaculata* Motschulsky]
Henosepilachna vigintioctopunctata (F.) [*Epilachna vigintioctopunctata* (F.), *Epilachna sparsa orientalis* Dieke]
Henosepilachna vigintisexpunctata (Boisduval) [*Epilachna philippinensis* Dieke]
Henosepilachna yasutomii Katakura [*Epilachna yasutomii* (Katakura)]
Hippodamia arctica (Schneider) [*Adonia arctica* (Schneider)]
Hippodamia caseyi Johnson
Hippodamia convergens Guerin – convergent ladybeetle
Hippodamia glacialis (F.) – glacial lady beetle
Hippodamia parenthesis (Say) – parenthesis lady beetle
Hippodamia quinquesignata (Kirby)
Hippodamia quinquesignata punctulata Le Conte [*Hippodamia quinquesignata ambigua* LeConte]
Hippodamia septemmaculata (DeGeer)
Hippodamia sinuata Mulsant
Hippodamia tredecimpunctata (L.) – thirteen spot ladybird
Hippodamia variegata (Goeze) – Adonis ladybird, variegated lady beetle [*Adonia variegata* (Goeze)]
Hyperaspis aestimabilis Mader
Hyperaspis bigeminata (Randall)
Hyperaspis binotata (Say)
Hyperaspis campestris (Herbst)
[*Hyperaspis congressis* Watson] = *Hyperaspis conviva* Casey
Hyperaspis conviva Casey [*Hyperaspis congressis* Watson]
Hyperaspis desertorum Weise
Hyperaspis lateralis Mulsant
Hyperaspis notata Mulsant
Hyperaspis pantherina Fürsch
Hyperaspis raynevali Mulsant
Hyperaspis reppensis (Herbst)
Hyperaspis senegalensis Mulsant
Hyperaspis senegalensis hottentotta Mulsant
Hyperaspis sphaeridioides Mulsant
Hyperaspis undulata (Say)
Illeis bielawskii Ghorpade
Illeis cincta (F.)
Illeis galbula (Mulsant) [*Leptothea galbula* (Mulsant)]
Illeis koebelei Timberlake
Jauravia quadrinotata Kapur
[*Leis dimidiata* (F.)] = *Harmonia dimidiata* (F.)
[*Leis*] = *Harmonia*
[*Lemnia biplagiata* (Swartz)] = *Coelophora biplagiata* Swartz
[*Leptothea galbula* (Mulsant)] = *Illeis galbula* (Mulsant)
Lindorus lophanthae (Blaisdell) [*Rhyzobius lophantae* (Blaisdell), *Rhyzobius lorophantae* (Blaisdell)]
Lioadalia flavomaculata (De Geer) [*Adalia flavomaculata* (De Geer)]
Macroilleis hauseri (Mader) [*Halyzia hauseri* (Mader)]
Macronaemia hauseri (Weise)

Megalocaria dilatata (F.) [*Anisolemnia dilatata* (F.)]
[*Menochilus quadriplagiatus* (Swartz)] = *Menochilus sexmaculatus* (F.)
Menochilus sexmaculatus (F.) [*Cheilomenes sexmaculata* (F.), *Menochilus quadriplagiatus* (Swartz)]
Micraspis allardi (Mulsant)
Micraspis discolor (F.)
Microweisea sp.
Mulsantina hudsonica (Casey)
Mulsantina picta (Randall)
Myrrha octodecimguttata (L.) – eighteen spot ladybird
Myzia oblongoguttata (L.) – striped ladybird
Myzia subvittata (Mulsant)
Neda marginalis Mulsant
Neocalvia anastomozans Crotch
[*Nephaspis oculatus* (Blatchley)] = *Clitostethus oculatus* (Blatchley)
Nephus bilucernarius (Mulsant)
Nephus bisignatus (Boheman)
Nephus flavifrons (Melsheimer) [*Scymnus flavifrons* Melsheimer, North America, not *Scymnus flavifrons* Blackburn, Australia]
Nephus guttulatus (LeConte) [*Scymnus guttulatus* LeConte]
Nephus includens (Kirsch)
Nephus kiesenwetteri (Mulsant) [*Scymnus kiesenwetteri* Mulsant]
Nephus ornatus (LeConte) [*Scymnus ornatus* LeConte]
Nephus quadrimaculatus (Herbst) [*Scymnus quadrimaculatus* (Herbst)]
Nephus redtenbacheri (Mulsant)
Nephus soudanensis (Sicard) [*Scymnus soudanensis* Sicard]
Oenopia billieti (Mulsant)
Oenopia conglobata (L.) [*Synharmonia conglobata* (L.)]
Oenopia kirbyi Mulsant
Oenopia lyncea (Olivier)
Oenopia sexareata (Mulsant)
[*Olla abdominalis* (Say)] = *Olla v-nigrum* (Mulsant)
Olla v-nigrum (Mulsant) – ash-gray lady beetle [*Olla abdominalis* (Say)]
Orcus australasiae (Boisduval)
[*Orcus chalybeus* (Boisduval)] = *Halmus chalybeus* (Boisduval)
Palaeoneda auriculata (Mulsant) [*Paleoneda miniata* (Hope)]
[*Paleoneda miniata* (Hope)] = *Palaeoneda auriculata* (Mulsant)
Pania luteopustulata Mulsant
Paranaemia vittigera (Mannerheim)
Parastethorus nigripes (Kapur) [*Stethorus loxtoni* Britton & Lee]
Parexochomus melanocephalus (Zoubkoff) [*Exochomus melanocephalus* (Zoubkoff))
Parexochomus nigromaculatus (Goeze) [*Exochomus nigromaculatus* (Goeze)]
Parexochomus troberti (Mulsant) [*Exochomus troberti* (Mulsant)]
Parexochomus troberti concavus (Fuersch) [*Exochomus concavus* Fuersch]
Pentilia insidiosa Mulsant
Pharoscymnus anchorago (Fairmaire)
Pharoscymnus numidicus (Pic)
Pharoscymnus ovoideus Sicard
Phymatosternus lewisii (Crotch)
Platynaspis luteorubra (Goeze)
Priscibrumus lituratus (Gorham) [*Exochomus lituratus* (Gorham)]
Priscibrumus uropygialis (Mulsant)
Propylea dissecta (Mulsant)
Propylea japonica (Thunberg)
Propylea quatuordecimpunctata (L.) – fourteen spot ladybird [*Propylaea quatuordecimpunctata* (L.)]
Pseudoazya trinitatis (Marshall) [*Azya trinitatis* (Marshall)]
[*Pseudoscymnus tsugae*] Sasaji & McClure] = *Sasajiscymnus tsugae* (Sasaji & McClure)
[*Pseudoscymnus kurohime* (Mityake)] = *Sasajiscymnus kurohime* (Miyatake)
Psyllobora confluens (F.)
Psyllobora vigintiduopunctata (L.) – twenty two spot ladybird [*Thea vigintiduopunctata* (L.)]
Psyllobora vigintimaculata (Say) – twenty-spotted lady beetle
[*Pullus auritus* (Thunberg)] = *Scymnus auritus* Thunberg
[*Pullus mediterraneus* (F.)] = *Scymnus marinus* (Mulsant)
[*Pullus subvillosus* (Goeze)] = *Scymnus subvillosus* (Goeze)
Rhyzobius litura (F.)
[*Rhyzobius lophanthae* (Blaisdell)] = *Lindorus lophanthae* (Blaisdell)
[*Rhyzobius lorophanthae* (Blaisdell)] = *Lindorus lophanthae* (Blaisdell)
Rhyzobius ventralis (Erichson) – black lady beetle
Rodatus major (Blackburn)
Rodolia cardinalis (Mulsant) – vedalia beetle
Rodolia fumida Mulsant
Rodolia guerini (Crotch)

Rodolia iceryae Janson
Rodolia occidentalis Weise
Sasajiscymnus kurohime (Miyatake) [*Pseudoscymnus kurohime* (Miyatake)]
[*Sasajiscymnus ningshanensis* (Sasaji & McClure)] = *Scymnus ningshanensis* Yu & Yao
Sasajiscymnus tsugae (Sasaji & McClure) [*Pseudoscymnus tsugae* Sasaji & McClure]
[*Scymnodes lividigaster* (Mulsant)] = *Apolinus lividigaster* (Mulsant)
Scymnus abietis (Paykull)
[*Scymnus aeneipennis* Sicard] = *Zagloba aeneipennis* (Sicard)
Scymnus apetzi Mulsant
Scymnus ater Kugelann
Scymnus auritus Thunberg [*Pullus auritus* (Thunberg)]
Scymnus coccivora Ayyar
Scymnus creperus Mulsant
Scymnus dorcatomoides Weise
Scymnus flavifrons Blackburn (Australia)
[*Scymnus flavifrons* Melsheimer] (North America) = *Nephus flavifrons* (Melsheimer)
Scymnus frontalis (F.)
[*Scymnus guttulatus* LeConte] = *Nephus guttulatus* (LeConte)
Scymnus haemorrhoidalis Herbst
Scymnus hilaris Motschulsky
Scymnus hoffmanni Weise
Scymnus impexus Mulsant
Scymnus interruptus (Goeze)
[*Scymnus kiesenwetteri* Mulsant] = *Nephus kiesenwetteri* (Mulsant)
Scymnus lacustris LeConte
Scymnus levaillanti Mulsant
Scymnus loewii Mulsant – dusky lady beetle
Scymnus louisianae Chapin
Scymnus marginicollis Mannerheim
Scymnus marinus (Mulsant) [*Scymnus mediterraneus* Iablokoff-Khnzorian, *Pullus mediterraneus* (Iablokoff-Khnzorian)]
[*Scymnus mediterraneus*] = *Scymnus marinus* (Mulsant)
Scymnus morelleti Mulsant
Scymnus nigrinus Kugelann
Scymnus ningshanensis Yu & Yao [*Sasajiscymnus ningshanensis* (Sasaji & McClure)]
[*Scymnus ornatus* LeConte] = *Nephus ornatus* (LeConte)
Scymnus otohime Kamiya
Scymnus posticalis Sicard
Scymnus postpictus Casey
Scymnus pyrocheilus Mulsant
Scymnus quadrillum Motschulsky
[*Scymnus (Nephus) quadrimaculatus* (Herbst)] = *Nephus quadrimaculatus* (Herbst)
Scymnus rubromaculatus (Goeze)
Scymnus sinuanodulus Yu & Yao
Scymnus smithianus Silvestri
Scymnus soudanensis Sicard
Scymnus subvillosus (Goeze) [*Pullus subvillosus* (Goeze)]
Scymnus suturalis Thunberg
Scymnus syriacus (Marsuel)
Scymnus tardus Mulsant
[*Semiadalia undecimnotata* (Schneider)] = *Ceratomegilla undecimnotata* (Schneider)
Serangium parcesetosum Sicard
[*Sidis*] = *Nephus*
[*Spiladelpha barovskii kiritschenkoi* Semenov-Tian-Shanski] = *Ceratomegilla barovskii kiritschenkoi* (Semenov-Tian-Shanski)
Sospita vigintiguttata (L.)
Stethorus bifidus Kapur
Stethorus gilvifrons (Mulsant)
Stethorus japonicus Kamiya
[*Stethorus loxtoni* Britton & Lee] = *Parastethorus nigripes* (Kapur)
Stethorus madecassus Chazeau
[*Stethorus picipes* Casey] = *Stethorus punctum picipes* Casey
[*Stethorus punctillum* Weise] = *Stethorus pusillus* (Herbst)
Stethorus punctum (LeConte) – spider-mite destroyer
Stethorus punctum picipes Casey [*Stethorus picipes* Casey]
Stethorus pusillus (Herbst) [*Stethorus punctillum* (Weise)]
Stethorus tridens Gordon
Stethorus vegans (Blackburn)
Subcoccinella vigintiquatuorpunctata (L.) – twenty four spot ladybird
[*Synharmonia conglobata* (L.)] = *Oenopia conglobata* (L.)
Synona obscura Poorani, Ślipiński & Booth
Synonycha grandis (Thunberg)
Thalassa saginata Mulsant
[*Thea vigintiduopunctata* (L.)] = *Psyllobora vigintiduopunctata* (L.)
Tytthaspis sedecimpunctata (L.) – sixteen spot ladybird
[*Tytthaspis trilineata* (Weise)] = *Coccinella nigrovittata* Kapur
[*Verania*] = *Micraspis*

Vibidia duodecimguttata (Poda)
Zagloba aeneipennis (Sicard) [*Scymnus aeneipennis* Sicard]

OTHER ORGANISMS

In alphabetical order within each taxon, and with Family given in italics within brackets after the authority

OTHER INSECTS

Dermaptera

Anechura harmandi (Burr) *(Forficulidae)* – hump earwig
Forficula auricularia L. *(Forficulidae)* – European earwig

Hemiptera: Heteroptera

Calocoris norvegicus (Gmelin) *(Miridae)* – strawberry bug
Campylomma verbasci (Meyer) *(Miridae)* – mullein bug
Caternaultiella rugosa (Schoutenden) *(Plataspidae)*
Eurygaster integriceps Puton *(Pentatomidae)* – sunn pest or corn bug
Geocoris punctipes (Say) *(Lygaeidae)* – big-eyed bug
Hyaliodes vitripennis (Say) *(Miridae)*
Lygus hesperus (Knight) *(Miridae)* – western plant bug
Lygus lineolaris (Palidot de Beauvois) *(Miridae)* – tarnished plant bug
Lygus (Miridae)
Nabis (Reduviolus) americoferus Carayon *(Nabidae)* – common damsel bug
Nysius huttoni White *(Lygaeidae)* – wheat bug
Orius insidiosus (Say) *(Anthocoridae)* – insidious flower bug
Podisus maculiventris (Say) *(Pentatomidae)* – spined soldier bug
Pyrrhocoris apterus (L.) *(Pyrrhocoridae)* – firebug
Sidnia kinbergi (Stål) *(Miridae)*

Hemiptera: Auchenorrhyncha

Homalodisca vitripennis (Germar) *(Cicadellidae)* – glassy-winged sharpshooter
Nilaparvata lugens (Stål) *(Delphacidae)* – brown planthopper
Philaenus spumarius (L.) *(Cercopidae)* – common froghopper or meadow spittlebug

Hemiptera: Sternorrhyncha: Aphidoidea

(Synonyms are in square brackets)

Acyrthosiphon caraganae (Cholodkovsky) *(Aphididae)*
Acyrthosiphon ignotum Mordvilko *(Aphididae)*
Acyrthosiphon kondoi Shinji *(Aphididae)* – blue alfalfa aphid
[*Acyrthosiphon nipponicum* (Essig & Kuwana)] = *Neoaulacorthum nipponicum* (Essig & Kuwana) *(Aphididae)*
Acyrthosiphon pisum (Harris) *(Aphididae)* – pea aphid
Adelges cooleyi (Gillette) *(Adelgidae)* – Cooley spruce gall adelgid
Adelges laricis Vallot *(Adelgidae)* – larch adelgid
Adelges nordmannianae (Eckstein) *(Adelgidae)*
[*Adelges nusslini* (Boerner)] = *Adelges nordmannianae* (Eckstein) *(Adelgidae)*
Adelges piceae (Ratzeburg) *(Adelgidae)* – balsam woolly adelgid
Adelges tsugae Annand *(Adelgidae)*– hemlock woolly adelgid
Aphis carduella Walsh *(Aphididae)*
[*Aphis cirsiiacanthoidis* Boerner] = *Aphis fabae cirsiiacanthoidis* Scopoli *(Aphididae)*
Aphis craccivora Koch *(Aphididae)* – cowpea aphid or groundnut aphid
Aphis cytisorum cytisorum Hartig *(Aphididae)*
Aphis fabae Scopoli *(Aphididae)* – black bean aphid
Aphis fabae cirsiiacanthoidis Scopoli *(Aphididae)*
Aphis farinosa J.F.Gmelin *(Aphididae)*
Aphis glycines Matsumura *(Aphididae)* – soybean aphid
Aphis gossypii Glover *(Aphididae)* – cotton aphid or melon aphid
Aphis hederae Kaltenbach *(Aphididae)*
[*Aphis helianthi* Monell] = *Aphis carduella* Walsh *(Aphididae)*
Aphis jacobaeae Schrank *(Aphididae)*
[*Aphis laburni* Kaltenbach] = *Aphis cytisorum cytisorum* Hartig *(Aphididae)*
Aphis nerii Boyer de Fonscolombe *(Aphididae)* – oleander aphid
Aphis pomi De Geer *(Aphididae)* – green apple aphid
Aphis punicae Passerini *(Aphididae)*

Aphis sambuci L. *(Aphididae)* – elder aphid
Aphis spiraecola Patch *(Aphididae)* – spiraea aphid or green citrus aphid
Aphis spiraephaga F.P. Müller *(Aphididae)*
Aphis spiraephila Patch *(Aphididae)*
Aphis urticata J.F. Gmelin *(Aphididae)*
[*Aulacorthum magnoliae* (Essig & Kuwana)] = *Neoaulacorthum magnoliae* (Essig & Kuwana) *(Aphididae)*
Aulacorthum solani (Kaltenbach) *(Aphididae)* – glasshouse potato aphid or foxglove aphid
Betulaphis brevipilosa Boerner *(Aphididae)*
Betulaphis quadrituberculata (Kaltenbach) *(Aphididae)*
Brachycaudus helichrysi (Kaltenbach) *(Aphididae)* – leaf-curling plum aphid
Brachycaudus persicae (Passerini) *(Aphididae)* – black peach aphid
Brachycaudus prunicola (Kaltenbach) *(Aphididae)*
Brachycaudus tragopogonis (Kaltenbach) *(Aphididae)*
Brevicoryne brassicae (L.) *(Aphididae)* – cabbage aphid
Callipterinella calliptera (Hartig) *(Aphididae)*
Capitophorus elaeagni (Del Guercio) *(Aphididae)*
Cavariella konoi Takahashi *(Aphididae)*
Ceratovacuna lanigera Zehntner*(Aphididae)* – sugar cane woolly aphid
Cervaphis quercus Takahashi *(Aphididae)*
Chaetosiphon fragaefolii (Cockerell) *(Aphididae)* – strawberry aphid
Chaitophorus capreae (Mosley) *(Aphididae)*
Chaitophorus leucomelas Koch *(Aphididae)*
[*Chaitophorus versicolor* Koch] = *Chaitophorus leucomelas* Koch *(Aphididae)*
Chromaphis juglandicola (Kaltenbach) *(Aphididae)* – walnut aphid
Cinara palaestinensis Hille Ris Lambers *(Aphididae)*
Delphiniobium junackianum (Karsch) *(Aphididae)*
Diuraphis noxia (Kurdjumov) *(Aphididae)* – Russian wheat aphid
Drepanosiphum platanoidis (Schrank) *(Aphididae)* – sycamore aphid
Dysaphis crataegi (Kaltenbach) *(Aphididae)* – hawthorn–parsnip aphid
Dysaphis devecta (Walker) *(Aphididae)* – rosy leaf-curling aphid
Dysaphis plantaginea (Passerini) *(Aphididae)* – rosy apple aphid
Elatobium abietinum (Walker) *(Aphididae)* – spruce aphid
Eriosoma lanigerum (Hausmann) *(Aphididae)* – woolly apple aphid
Eucallipterus tiliae (L.) *(Aphididae)* – lime aphid
Euceraphis betulae (Koch) *(Aphididae)*
Euceraphis punctipennis (Zetterstedt) *(Aphididae)*
Hyalopterus pruni (Geoffroy) *(Aphididae)* – mealy plum aphid
Hyperomyzus carduellinus (Theobald) *(Aphididae)*
Hyperomyzus lactucae (L.) *(Aphididae)* – blackcurrant–sowthistle aphid
Laingia psammae Theobald *(Aphididae)*
Liosomaphis berberidis (Kaltenbach) *(Aphididae)*
Lipaphis pseudobrassicae (Davis) *(Aphididae)* – turnip aphid or mustard aphid
[*Longiunguis donacis* (Passerini)] = *Melanaphis donacis* (Passerini) *(Aphididae)*
Macrosiphoniella artemisiae (Boyer de Fonscolombe) *(Aphididae)*
Macrosiphoniella sanborni (Gillette) *(Aphididae)* – chrysanthemum aphid
Macrosiphum albifrons Essig *(Aphididae)* – lupin aphid
Macrosiphum euphorbiae (Thomas) *(Aphididae)* – potato aphid
[*Macrosiphum ibarae* (Matsumura)] = *Sitobion ibarae* (Matsumura) *(Aphididae)*
Macrosiphum rosae (L.) *(Aphididae)* – rose aphid
Megoura viciae Buckton *(Aphididae)* – vetch aphid
Melanaphis donacis (Passerini) *(Aphididae)*
Metopolophium dirhodum (Walker) *(Aphididae)* – rose–grain aphid.
Metopolophium festucae (Theobald) *(Aphididae)* – fescue aphid
Microlophium carnosum (Buckton) *(Aphididae)*
Microsiphoniella artemisiae (Gillette) *(Aphididae)*
Mindarus abietinus Koch *(Aphididae)*
Myzocallis boerneri Stroyan *(Aphididae)*
Myzocallis carpini (Koch) *(Aphididae)*
Myzocallis castanicola Baker *(Aphididae)*
Myzocallis coryli (Goetze) *(Aphididae)* – hazel aphid or filbert aphid
Myzus cerasi (F.) *(Aphididae)* – cherry blackfly
Myzus persicae (Sulzer) *(Aphididae)* – peach–potato aphid
Myzus persicae nicotianae Blackman *(Aphididae)*
Neoaulacorthum magnoliae (Essig & Kuwana) *(Aphididae)*
Neoaulacorthum nipponicum (Essig & Kuwana) *(Aphididae)*
Neomyzus circumflexus (Buckton) *(Aphididae)*
Neophyllaphis podocarpi Takahashi *(Aphididae)*
Periphyllus californiensis (Shinji) *(Aphididae)*
Periphyllus lyropictus (Kessler) *(Aphididae)*

Periphyllus testudinaceus (Fernie) *(Aphididae)*
Phorodon humuli (Schrank) *(Aphididae)* – damson–hop aphid
Phyllaphis fagi (L.) *(Aphididae)*
Phylloxera glabra (von Heyden) *(Phylloxeridae)*
Pineus pini (Macquart) *(Adelgidae)*
Pseudoregma alexanderi (Takahashi) *(Aphididae)*
Pseudoregma bambucicola (Takahashi) *(Aphididae)*
Pterocallis alni (deGeer) *(Aphididae)*
Rhopalosiphum maidis (Fitch) *(Aphididae)* – corn leaf aphid
Rhopalosiphum padi (L.) *(Aphididae)* – bird cherry–oat aphid
Schizaphis graminum (Rondani) *(Aphididae)* – greenbug
Schizolachnus pineti (F.) *(Aphididae)*
Schizolachnus piniradiatae (Davidson) *(Aphididae)*
Sitobion akebiae (Shinji) *(Aphididae)*
Sitobion avenae (F.) *(Aphididae)* – grain aphid
Sitobion ibarae (Matsumura) *(Aphididae)*
Symydobius oblongus (von Heyden) *(Aphididae)*
Thelaxes dryophila (Schrank) *(Aphididae)*
[*Therioaphis maculata* (Buckton)] = *Therioaphis trifolii* (Monell) *(Aphididae)* – spotted alfalfa aphid
Therioaphis trifolii (Monell) *(Aphididae)* – spotted alfalfa aphid
Toxoptera aurantii (Boyer de Fonscolombe) *(Aphididae)* – black citrus aphid or tea aphid
Toxoptera citricidus (Kirkaldy) *(Aphididae)* – brown citrus aphid
[*Toxoptera graminum* (Rondani)] = *Schizaphis graminum* (Rondani) *(Aphididae)* – greenbug
Tuberculatus annulatus (Hartig) *(Aphididae)*
Tuberolachnus salignus (J.F. Gmelin) *(Aphididae)* – willow aphid
Uroleucon aeneum (Hille Ris Lambers) *(Aphididae)*
Uroleucon ambrosiae (Thomas) *(Aphididae)*
Uroleucon cichorii (Koch) *(Aphididae)*
Uroleucon cirsii (L.) *(Aphididae)*
Uroleucon compositae (Theobald) *(Aphididae)*
Uroleucon formosanum (Takahashi) *(Aphididae)*
Uroleucon jaceae (L.) *(Aphididae)*
Uroleucon nigrotuberculatum (Olive) *(Aphididae)*
Vesiculaphis caricis (Fullaway) *(Aphididae)*

Hemiptera: other Sternorrhyncha

Abgrallaspis cyanophylli (Signoret) *(Diaspididae)*
Acutaspis umbonifera (Newstead) *(Diaspididae)*
Agonoscena pistaciae Burckhardt et Lauterer *(Psyllidae)*
Aleurodicus cocois (Curtis) *(Aleyrodidae)*
Aleurodicus dispersus Russell *(Aleyrodidae)*– spiralling whitefly
Aleurotuba jelinekii (Frauenfeld) *(Aleyrodidae)*
Aleyrodes proletella (L.) *(Aleyrodidae)*
Aonidiella aurantii (Maskell) *(Diaspididae)* – California red scale
Aonidiella orientalis (Newstead) *(Diaspididae)*
Aonidimytilus albus (Cockerell) *(Diaspididae)* – cassava scale
Aspidiotus destructor Signoret *(Diaspididae)*– coconut scale
Aspidiotus nerii Bouché *(Diaspididae)*
Asterolecanium sp. *(Asterolecaniidae)*
Aulacaspis tegalensis (Zehntner) *(Diaspididae)* – sugar cane scale
Aulacaspis tubercularis Newstead *(Diaspididae)*
Bemisia tabaci (Gennadius) *(Aleyrodidae)*
[*Bemisia argentifolii* Bellows] = *Bemisia tabaci* Gennadius *(Aleyrodidae)*
Chionaspis alnus Kuwana *(Diaspididae)*
Chionaspis salicis (L.) *(Diaspididae)*
Chrysomphalus aonidum (L.) *(Diaspididae)* – Florida red scale
Chrysomphalus bifasciculatus Ferris *(Diaspididae)*
Coccus hesperidum L.*(Coccidae)* – soft brown scale
Coccus viridis (Green) *(Coccidae)* – green coffee scale or soft green scale
Dactylopius opuntiae (Cockerell) *(Dactylopiidae)*
Diaphorina citri Kuwayama *(Psyllidae)* – Asian citrus psyllid
Diaspidiotus perniciosus (Comstock) *(Diaspididae)*
Dysmicoccus (Pseudococcidae)
Eriococcus coriaceus Maskell *(Eriococcidae)*
Eulecanium caraganae Borchsenius *(Coccidae)*
Ferrisia virgata (Cockerell) *(Pseudococcidae)* – striped mealybug
Hemberlesia lataniae (Signoret) *(Diaspididae)*
Heteropsylla cubana Crawford *(Psyllidae)*
Icerya purchasi Maskell *(Monophlebidae)*– cottony cushion scale
Lepidosaphes beckii (Newman) *(Diaspididae)* – citrus mussel scale
Lepidosaphes cornutus Ramakrishna Ayyar *(Diaspididae)*
Lepidosaphes ulmi (L.) *(Diaspididae)* – mussel scale or oystershell scale
Maconellicoccus hirsutus (Green) *(Pseudococcidae)* – pink hibiscus mealybug