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Key to the Coccidae of
California

1958

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KEY

to the

COCCIDAE OF CALIFORNIA

BY

C. W. WOODWORTH

Published by the Author
Berkeley, California

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INTRODUCTION

The Scale insects of this State have received a great deal of attention particularly along economic lines. This is the first attempt at making a synopsis for the recognition of our species. The form of the synopsis and of the references is uniform with the author's Key to Orthoptera, in which full explanations will be found.

The study of these insects requires ability to use the compound microscope and considerable microscopic technique. A laboratory guide for the study of scale insects is being prepared for publication for the use of those who may wish to take up the subject by themselves and desire a detailed description of the study methods.

The most useful books on scale insects are Newstead's Monograph of the British Coccidae, which contains the fullest general account of these insects, and Fernald's Catalogue of the Coccidae of the World, which is the best guide to the literature. For references to the literature of the local fauna, the present work will be found useful.

The author hopes that this key will stimulate many entomologists on this coast to collect and study in this group.

C. W. WOODWORTH.

University of California, October, 1903.

SYNOPSIS

COCCIDAE Female with flattened chitinous lobes at hind end of body **Diaspinae** without With triangular supraanal plates **Coccinae** without supraanal plates Adult females with antennae twelve jointed **Monophlebinae** nine-jointed or less Adult without mouth parts **Margarodinae** with mouth parts **Dactylopiinae**

MONOPHLEBINAe *Icerya purchasi* Mask 78M220 81C347 82C48 50 65 86 83C23 132 83C132 84C19 22 35 42 50 87C36 42 50 61 65 213 345 348 359 361 379 450 561 87M1 87O1 87R459 466 88S87 177 179 184 246 260 262 273 279 88M1 88R64 110 126 89H182 89R220 268 89W16 90C252 90L207 334 384 394 469 472 480 484 489 494 496 498 90R92 90S13 53 59 349 477 484 486 488 91M319 91R307 423 457 154 160 92C455 92L200 287 93R135 94C84 96 101 103 368 372 374 427 437 96C57 132 140 143 147 154 158 96T10 40 97C94 99C5 56 113 143 153 99W1 02C7 61 226 237 02A229 345 03F25 maskelli 97C94 99C113 03F27 crawii 97C84 99C113 03F27

MARGARODINAE *Xylococcus quercus* Ehr 00E311 03F33

1778 Modeer Act Goth i 28 Costa Atti del R Inst d Incor- rug iv 35 Costa Fauna 78 Maskell Trans New Zealand Inst xi 81 Comstock Rep U S Comm Agr 82 Cooper et al Rep Hort Comm Calif 83 Chapin et al Rep State Bd Hort Calif 84 Chapin et al Bien Rep State Bd Hort Calif 87 Cooper et al Bien Rep State Bd Hort Calif 87 Morse Bull Calif Agr Exp Sta lxxi 87 Ormerod Notes on Australian Bug 87 Riley et al Rep U S Comm Agr 88 Morse Bull Calif Agr Exp Sta lxxix 88 Riley et al Insect Life i 88 Scott et al Bien Rep State Bd Hort Calif iii 89 Howard Insect Life i 89 Riley et al Insect Life i 89 Willits Insect Life ii 90 Coquillett Insect Life ii 90 Lelong et al Rep State Bd Hort Calif 90 Riley et al Insect Life iii 90 Secretary et al Rep State Bd Hort Calif 91 Morse Rep Calif Agr Exp Sta 91 Riley et al Insect Life iii 92 Craw Rep St Bd Hort Calif 92 Lelong et al Rep State Bd Hort Calif 93 Riley Insect Life iv 94 Craw et al Rep State Bd Hort Calif 96 Craw et al Rep State Bd Hort Calif 96 Townsend Tech Bull U S Div Ent iv 97 Cockerell Psyche viii 97 Cockerell Proc U S Nat Mus xix 99 Craw et al Rep State Bd Hort Calif 99 Woodworth Bull Calif Agr Exp Sta cxxii 02 Craw et al Rep State Bd Hort Calif 02 Austin et al Rep State Bd Hort Calif viii 03 Fernald Bull Hatch Exp Sta lxxxviii

Cottony-cushion scale=I. purchasi

DACTYLOPIINAE Antennae nine-jointed c eight-jointed b six or seven-jointed a five-jointed *Sphaerococcus disticlium* Kuw 02K134 03F85 no antennae Young insect fringed with spines *Kermes* not End of abdomen strongly chitinous *Cerococcus* not *Pollinia pollini* Costa 94C438 96C43 03F60 coccus 28C202 a Body naked *Ripseriella kelloggi* Ehr & Coc 01E166 03F115 bordered with wax *Gossyparia spuria* Modeer 02K52 03F68 Coccus 1778M43 all covered with wax Young insect fringed with spines *Eriococcus* not Body six mm long *Dactylopius coccus* Costa 35C16 03F80 not over three mm long *Ripseria* b Legs absent *Lecaniodiaspis rubescens* 99E104 99C267 03F56 *Prosopophora* 93C151 present Body oval *Pseudococcus globular* *Erium erigoni* Ehr 99E103 02C465 03F112 c Anal ring without hairs *Phaeonococcus* with six hairs *Ceroputo*

Kermes Body with longitudinal constriction a without Color grey with black spots *galliformis* Riley 81R481 03F61 brown with white lines *austini* Ehr 91E104 00C44 00K81 03F60 a Segments gibbose *cockerelli* Ehr 98E185 00C44 00K80 03F61 not *nigropunctatus* Ehr & Coc 98E186 99C10 00C45 00K80 03F63

Cerococcus Sac of white wax *ehrhorni* Coc 95C255 95S363 01P387 03F57 yellow wax *quercus* Coms 81C213 83C130 01P387 03F57

Eriococcus Antennae six-jointed *palmeri* Coc 99C268 02C23 03F77 seven-jointed Anal ring of six spines *artemisiae*

1778 Modeer Act Goth i 28 Costa Atti del R Inst d Incor iv 35 Costa Faun Regn Nap Cocc 78 Maskell Trans N Z Ins xi 81 Cooke Treat Ins Inj Fruit 81 Riley Am Nat xv 81 Comstock Rep U S Dept Agr 83 Comstock Rep Dept Ent Corn Univ ii 91 Ehrhorn Canad Ent xxxi 93 Cockerell Science xxii 94 Craw Bien Rep Cal Bd Hort iv 95 Cockerell Psyche vii 96 Craw Bien Rep Cal Bd Hort v 98 Cockerell Canad Ent xxx 98 Ehrhorn Canad Ent xxx 98 Ehrhorn Ent News ix 99 Cockerell Proc Acad Nat Sci Phila 99 Cockerell Biol Cent Am ii 99 Cockerell Canad Ent xxxi 99 Ehrhorn Canad Ent xxxi 00 Cockerell Psyche ix 00 Ehrhorn Canad Ent xxxii 00 King Psyche ix 01 Ehrhorn & Cockerell Proc Biol Soc Wash xiv 01 Patterson Proc Cal Acad Sci ii 01 Kuwani Proc Cal Acad Sci ii 02 Cockerell Ann & Mag Nat Hist ix 02 Kuwani Ent News xiii 03 Fernald Bull Hatch Exp Sta lxxxviii

Kuw 01K399 03F71 eight spines Anal tubercles with three spines *adenostomae* Ehr 98E244 98C246 03F70 with one *auricariae* Mask 78M218 96C40 03F71 03C73 *Rhizococcus* 81C339

Ripseria Length three mm *festucae* Kuw 01K401 02C21 03F117 one and a half mm *villosa* Ehr 99E6 03F120

Pseudococcus * With dense ventral cottony cushion *iceryoides* Mask 03F103 *Dactylopius* 91M33 93R286 94C34 ventral wax not more than dorsal Band of yellow powder on back *aurilanatus* Mask 03F97 *Dactylopius* 89M151 96C45 not banded Antennal joint two longer than seven a equal Joint four shortest *citri* Risso *Dorthesia* 13R *Dactylopius* 89C121 destructor 99R128 as long as six *sequoiae* Col 03F109 *Dactylopius* 01C109 a Anal appendages as long as body *longispinis* Targ *Dactylopius* 69T32 *longifilis* 90C43 *adonidum* 92C286 96C40 shorter First antennal joint shorter than fifth b longer Anal filaments half as long as body *maritimus* Ehr 03F106 *Dactylopius* 00E315 not over a third First antennal joint longer than third *dudlei* Col *Dactylopius* 03C63 73 shorter Second antennal joint longer than fourth *andersoni* Col *Dactylopius* 03C67 73 equal *ryani* Coq 03F108 *Dactylopius* 89C122 94C100 97C773 b Fifth antennal joint four times as long as broad *ephedrae* Coq 03F101 *Dactylopius* 90C43 90S305 only twice Cephalic filaments present *salinus* Coc 03F109 *Dactylopius* 02C21 absent Posterior lateral filaments nearly as long as anal *azaleae* Tin

13 Risso Essai Hist Nat Oranges 69 Targione-Tossetti Catalogue 78 Ashmead Canad Ent x 78 Maskell Trans N Z Ins xi 81 Comstock Rep U S Dept Agr 89 Coquillett West Am Sci vi 89 Maskell Trans New Zealand Inst xxii 90 Coquillett West Am Sci vii 90 Sharp Zool Rec xxvii 91 Maskell Trans New Zealand Inst xxiv 92 Craw Rep Cal State Bd Hort 93 Riley & Howard Insect Life v 94 Cockerell Canad Ent xxvi 95 Loundsbury Rep Mass Agr Coll xxxii 97 Cockerell Proc U S Nat Mus xix 98 Cockerell Canad Ent xxx 98 Ehrhorn Canad Ent xxx 99 Ehrhorn Canad Ent xxxi 99 Rust et al Rep State Bd Hort Calif vi 00 Ehrhorn Canad Ent xxxii 01 Coleman Proc Cal Acad Sci ii 01 Kuwani Proc Cal Acad Sci ii 02 Cockerell Ann & Mag Nat Hist ix 03 Coleman Journ N Y Ent Soc xi 03 Fernald Bull Hatch Exp Sta lxxxviii

* *Orthesia edwardsii* Ash 78A203 95L125 03F323 probably male of *Pseudococcus* Mealybugs=*Pseudococcus*

03F98 *Dactylopius* 98T319 much shorter Body light yellow
crawii Coq 03F101 *Dactylopius* 89C122 greenish brown
quercus Ehr 03F108 *Dactylopius* 00E315

Phenacoccus Fourth antennal joint slightly shorter than
 ninth *artemisiae* Ehr 00E313 03F90 slightly longer *stachyos*
 Ehr 00E313 03F93 much shorter Length 1.6 mm *kuwanae*
 03C62 73 3 mm *simplex* King 02K42 03F93

Ceroputo Body with three ridges of cottony tufts *bahiae*
 Ehr 01C166 03F94 *Phenacoccus* 00E134 not tufted *yuccae*
 Coq 01C166 03F95 *ceanothi* 03C163 *Blastothrix yuccae* 90C44
Pseudococcus 93R40 96T12

COCCINAE Body entirely covered by cottony secretion
Exaertopus caricis Ehr 02E193 03F143 with only a cottony
 ovisac behind *Pulvinaria* covered with horny plates *Cero-*
plastus with horny starlike projections *Vinsonia stellifera*
 Westw 03F159 *Coccus* 71W3 naked or nearly so Antennae
 minute or wanting *Aclerda californica* Ehr 03F210 *Nidu-*
laria 99E103 *Pseudolecanium* 00P135 about as long as the
 legs Body at least half as high as long a flat Surface
 strongly reticulate *Eucalynnatus perforatus* Newst 03F166
Lecanium 94N233 *tesselatum* 96W256 96T263 scarcely
 reticulate *Coccus* a Dorsum much wider than sternum
Physokermes equal Pits in dorsum not further apart than
 four times their diameter *Saissetia* nine or ten times
Eulecanium

Pulvinaria Body as broad as long *ehrhorni* King 01K145
 03F132 longer than broad Third and fourth antennal joints
 equal *vitis* Linn 92L203 *Coccus* 1758L456 third the longest
 Fourth and fifth joints equal *psidii* Mask 92M223 96C47
 03F137 fourth the longer Sixth and eighth equal *bigeloviae*

1758 Linnaeus Sys Nat i 71 Westwood Proc Ent Soc Lond
 89 Coquillett West Am Sci vi 90 Coquillett West Am Sci
 viii 92 Lelong ibid 92 Maskell Trans New Zealand Inst
 xxv 93 Riley and Howard Insect Life vi 94 Newstead Ent
 Mo Mag xxx 96 Craw Rep Cal State Bd Hort 96 Tyrrell
 Rep Cal Agr Exp Sta 96 Woodworth ibid 98 Ehrhorn
 Ent News ix 98 Tinsley Canad Ent xxx 99 Ehrhorn
 Canad Ent xxxi 00 Ehrhorn Canad Ent xxxii 00 Parr
 Bull Kans Agr Exp Sta xcvi 01 Cockerell Proc Biol Soc
 Wash xiv 01 King Canad Ent xxxiii. 02 King Ent News
 xiii 03 Coleman Journ N Y Ent Soc xi 03 Fernald Bull
 Hatch Exp Stat lxxxviii

Coc 93C366 03F129 eighth the longer First and sixth with a single hair rhois Ehr 98E186 03F138 with two or three innumerabilis Rathv 87K379 90C54 92C287 03F134 Coccus 54R256

Ceroplastes Wax plates of adult fusing together a distinct Length 7 mm *cistudiformis* Towns 92T256 98C119 about 5 mm *cirripediformis* Coms 81C333 90G480 a Length two to four mm b six to ten Tail short *irregularis* Coc 93C351 03F153 rather long *ceriferus* Auds 96C44 Coccus 1791A b Wax dull red or pinkish throughout *rubens* Mask 92M214 96C44 brownish on dorsum dirty white at edge *floridensis* Coms 81C331 90C480 03F151

Coccus Antennae with seventh joint longest *hesperidum* Linn 1758L455 03F168 *Lecanium* 81C335 87K359 362 365 369 379 88C177 89R299 90C193 282 285 90M474 490 90C53 92C286 93C103 94C96 146 369 371 377 379 383 431 96C40 96C132 147 154 96T267 96W255 97C736 99P145 02C192 229 236 346 03C73 third or fourth longer than seventh *ventralis* Ehr 03F174 *Lecanium* 98E245 99C230

Physokermes Sixth antennal joint the longest *concolor* Col 03C73 shorter than the second Fourth joint the shortest *taxifoliae* Col 03C73 longer than fifth *insignicola* Craw 95C258 97C591 *Lecanium* 94C92 94C625 96T263 96W256

Saissetia Pits of dorsum enclosed in polygonal areas *oleae* Bern 03F205 *Chermes* 1782B *Lecanium* 82D19 35 65

1758 Linnaeus Syst Nat 1 1782 Bernard Mem Hist Nat Acad Mars 1791 Anderson Mon Cocc 54 Rathvon Penn Farm Journ 81 Comstock Rep U S Dept Agr 82 Dwinell et al Rep Cal State Bd Hort 87 Klee ibid 88 Cooper et al ibid 89 Riley Insect Life 90 Coquillett West Am Sci viii 90 Craw Rep Cal State Bd Hort 90 Comstock ibid 90 Gray ibid 90 Motheral ea al ibid 92 Craw ibid 92 Maskell Trans New Zealand Inst xxv 92 Townsend Zoe iii 93 Cockerell Trans Am Ent Soc xx 93 Cockerell The Ent xxvi 93 Cockerell Insect Life vi 94 Craw et al Rep Cal State Bd Hort 94 Cockerell Proc U S Nat Mus xvii 95 Cockerell Canad Ent xxvii 96 Craw Bull U S Div Ent Tech iv 96 Craw Rep Cal State Bd Hort 96 Tyrrell Rep Cal Agr Exp Sta 96 Woodworth ibid 97 Cockerell Proc U S Nat Mus xix 97 Cockerell Am Nat xxxi 98 Cockerell Proc The Ent xxxi 98 Ehrhorn Ent News ix 99 Cockerell and Parr The Indust 99 Pryal et al Rep Cal Agr Exp Sta 02 Craw Rep Cal State Bd Hort 03 Coleman Journ N Y Ent Soc xi 03 Fernald Bull Hatch Exp Sta lxxxviii

Soft brown scale=*C. hesperidum* Black scale=*S. oleae*

85 86 87 83C21 87C35 44 45 52 346 348 353 356 359 366 369
 88C142 183 246 267 276 90C195 197 281 282 334 385 420 425
 472 475 480 484 489 490 491 492 496 500 90L13 59 281 484
 486 90P98 90R248 379 91H578 91R182 91R163 92B39 116 200
 285 392 93C253 93R10 27 103 94C93 99 103 146 358 363 369
 371 374 426 96C40 96C57 143 146 154 157 160 96T265 96W253
 97C736 99L5 77 128 139 143 153 155 99W1 01L10 61 64 69
 226 235 241 02C91 201 229 233 238 347 364 03C74 not hemi-
 sphaericum Targ 03F202 Lecanium 67T26 81C334 87K379
 90C192 93C103 94M379 96I154 96T266 hibernaculorum 97C744

Eulecanium First antennal joint the shortest *adenos-
 tomæ* Kuw 03F180 Lecanium 01K402 longer than fifth or
 sixth Seventh joint shorter than first or second *pubescens*
 Ehr 99C237 03F194 Lecanium 98E244 longer Third joint
 shorter than fourth and fifth together *quercitroneis* Fitch
 03F195 Lecanium 58F805 *kermoides* Tyr 96T256 longer Sec-
 ond joint longer than fourth *pruinoseum* Coq 03F193 Leca-
 nium 91C382 90L13 92C33 96T268 shorter Fourth joint
 longer than seventh *crawii* Ehr 98E245 99C237 shorter
armeniaceum Craw 03F181 Lecanium 88K246 90L198 469 477
 489 494 90L13 92B39 116 197 286 94C97 375 96E158 96T268
 01C67 232 02C193 195 200 215 226 233

DIASPINAE Female scale round or oval a more than

58 Fitch Rep Ins N Y v 67 Targioni Tozetti Studii Cocc
 81 Comstock Rep U S Dept Agr 83 Chapin Rep Cal State
 Bd Hort 87 Cooper et al ibid 87 Klee ibid 88 Cooper et
 al ibid 88 Klee ibid 90 Comstock et al ibid 90 Lelong
 ibid 90 Packard Rep U S Ent Com v 91 Coquillett Insect
 Life iii 91 Howard Proc U S Nat Mus xiv 91 Riley Insect
 Life iii 91 Riley et al Insect Life iv 92 Block et al Rep
 Cal State Bd Hort 92 Coquillett Bull U S Div Ent xxvi
 93 Coquillett Insect Life v 93 Riley et al ibid vi 94 Craw
 et al Rep Cal State Bd Hort 94 McIntyre ibid 96 Craw
 ibid 96 Craw Bull U S Ent Tech iv 96 Ehrhorn Rep Cal
 State Bd Hort 96 Tyrrell Rep Cal Agr Exp Sta 96 Wood-
 worth ibid 97 Cockerell Proc U S Nat Mus xix 98 Ehr-
 horn Canad Ent xxx 99 Cockerell & Parr The Industrialist
 99 Lelong et al Rep Cal State Bd Hort 99 Woodworth Bull
 Cal Agr Exp Stat cxlii 01 Craw et al Rep Cal State Bd
 Hort 01 Kuwana Proc Cal Acad Sci ii 01 Lelong et al
 Rep Cal State Bd Hort 02 Craw et al ibid 03 Coleman
 Journ N Y Ent Soc xi 03 Fernald Bull Hatch Exp Sta
 lxxxviii

Brown apricot scale=*E. armeniaceum*

twice as long as broad Spinnerets absent **Leucaspis** in five groups **Lepidosaphes** three groups **Ischnaspis longirostris** Sign filiformis 96C40 **Mytilaspis longirostris** 82S35 a Male scale round or oval c elongate Tubular glands absent **Fiorina florinae** Targ 63F246 **cameliae** 96C40 **Diaspis florinae** 67T14 Spinnerets absent **Howardia biclavis** Coms 03F227 **Chionaspis** 83C97 91C14 present Tubular glands arranged in bands b irregular Plates branching **Parlatoria pergandii** Coms 81C327 96C130 149 03F319 simple Scale white **Phenacaspis** not **Diaspis** b Median lobes on the sides of a depression **Aulacaspis** not Female scale with exuviae central or nearly so **Epidiaspis piricola** Del 03F250 **Aspidiotus** 94D142 **Diaspis** 97C4 02E233 marginal Apices of median lobes touching **Hemichionaspis aspidistrae** Sign 99C45 03F239 **Chionaspis** 69S443 distant **Chionaspis** c Dorsum with lattice work posteriorly **Pseudaonidia** not Lobes wanting **Odontaspis babusarum** Coc 03F299 **Aspidiotus** 98C191 subobsolete **Targionia bigeloviae** Coc 00L226 03F296 **Aspidiotus** 97C20 99N25 99C278 one or two pairs distinct **Aspidiotus** three pairs distinct **Chrysomphalus**

Leucaspis One pair of lobes **cupressi** Col*03C71 75 three pairs **kelloggi** Col 03C68 75 four pairs **japonicus** Coc 97C53 98C111 03F244

Lepidosaphes Lobes serrate **beckii** Newm 03F305 **Coccus** 69N217 **Mytilaspis citricola** 90C478 92L195 94C84 95 105 362 440 96C41 96L60 143 149 99R127 143 153 01H225 236 240 243 245 02B223 230 236 not serrate Lobes pointed **gloverii** Pack

67 Targioni Tozzetti Studii sul Cocc 69 Newman The Ent iv 69 Signoret Ann Soc Ent Fr 81 Comstock Rep U S Dept Agr 82 Signoret Ann Soc Ent Fr 83 Comstock Rep Cornell Dept Ent ii 90 Gray Rep Cal State Bd Hort 91 Craw ibid 92 Lelong ibid 94 Craw et al ibid 94 Del Guer II Nat Sicil 96 Craw Bull U S Ent Tech iv 96 Craw Rep Cal State Bd Hort 96 Lelong ibid 97 Cockerell Bull U S Ent Tech vi 98 Cockerell Psyche viii 99 Cooley Spec Bull Hatch Exp Sta 99 Cockerell & Parr The Indust 99 Newell Cont Iowa Ag Coll iii 99 Rust et al Rep Cal State Bd Hort 00 Leonardi Gen et sp Dias 01 Hamilton et al Rep Cal State Bd Hort 02 Bishop et al ibid 02 Ehrhorn ibid 03 Coleman Journ N Y Ent Soc xi 03 Fernald Bull Hatch Exp Sta ixviii

Purple scale=L. beckii

03F309 Coccus 69P527 Mytilaspis 90C479 91R487 92L196 94C95 96C41 96M149 rounded Anterior spinnerets three **newsteadi** Sulc 95S8 03C74 eleven to seventeen **ulmi** Linn 03F314 Coccus 1758L455 Mytilaspis pomorum 90C184 477 91R487 92L195 94B360 363 365 96I154 01S217 02J219 Aspidiotus conchiformis 82C56 66 72 84 83C22 84C32 87K345 558

Chionaspis With a single median lobe **quercus** Coms 81C319 83C105 90P103 03F223 with two median lobes Spinnerets wanting **citri** Coms 83C101 96C38 about six lateral **assimilis** Mask 88M102 96C35 03F214 about ten **euonymi** Coms 81C313 91R487 96C38 over twenty Second and third lobes notched **dificilis** Coc 96C21 96C41 96C38 divided into lobules Inner lobule of second lobes at least half as wide as median lobes **a** about a third as wide Lateral spinnerets more than fifty-five **wistariae** Cool 97C280 99C39 03F226 less **spartinae** Coms 83C106 03F226 Outer lobule of second lobes nearly as long as inner **pinifoliae** Fitch 99C30 03F221 03C74 Aspidiotus 55F488 about half as long Two spines at base of median lobes **ortholobis** Coms 81C317 99C17 03F221 one Inner lobule of second lobe narrowed outwardly **furfura** Fitch 99C88 Aspidiotus 56F352 not **salacisnigrae** Walsh 99C19 Aspidiotus 68W40

Aulacaspis Lateral spinnerets about continuous **rosae** Bouche 03F236 Aspidiotus 34B14 Diaspis 96C40 not continuous Median spinnerets not over thirteen **pentagona** Targ

1758 Linnaeus Syst Nat i 34 Bouche Naturg Ins 55 Fitch Rep Ins N Y ii 56 Fitch Rep Ins N Y iii 68 Walsh Rep Ins Ill i 69 Packard Guide Study Ins 81 Comstock Rep U S Dept Agr 82 Chapin Rep Cal State Bd Hort 83 Chapin ibid 83 Comstock Rep Cornell Dept Ent ii 84 Chapin Rep Cal State Bd Hort 85 Targioni Tozetti Rev Bacc 87 Klee Rep Cal State Bd Hort 88 Maskell Trans Roy Soc S Aust 90 Comstock et al Rep Cal State Bd Hort 90 Packard Rep U S Ent Comm v 91 Riley & Howard Insect Life iii 92 Lelong Rep Cal State Bd Hort 94 Barber et al ibid 94 Craw et al ibid 96 Craw ibid 96 Craw Bull U S Div Ent Tech iv 96 Melville Rep Cal State Bd Hort 97 Cockerell Cal Fruit Grower 97 Cooley Canad Ent xxix 98 Cockerell Psyche viii 99 Cooley Spec Bull Hatch Exp Sta 01 Stewart Rep Cal State Bd Hort 02 Janssen ibid 02 Cockerell The Ent xxxv 03 Coleman Journ N Y Ent Soc xi 03 Fernald Bull Hatch Exp Sta lxxxviii

Oyster shell scale=L. ulmi

03F234 Diaspis 85T11 not under twenty-four *crawii* Coc
02C59 03F233 Diaspis 98C190 ..

Phenacaspis Lateral lobes divided into three lobules
latissima Coc 03F238 Chionaspis 97C45 97C282 into two
Median lobes separate at base *chinensis* Coc 03C48 03F237
Chionaspis 96C37 united About ten plates beyond lateral
lobes *aucubae* Cool 03F237 Chionaspis 97C279 about five
plates *cockerelli* Cool 03F237 Chionaspis 97C279

Diaspis *Exuviae* marginal *cattleyae* Coc 02C59 03F229
Aulacaspis 99C30 back from the margin Lobes on sides of
a depression *boisduvalii* Sign 69S432 not *carulei* Targ 69T43
03C74

Pseudaonidia With two groups of spinnerets *paeoniae*
Coc 03F283 *Aspidiotus duplex* 99C105 five groups *duplex*
Coc 03F283 *Aspidiotus* 96C20 96C33

Aspidiotus With four pairs of lobes *californicus* Col
03C64 74 two or three a one One pair of incisions *aesculi*
Johns 96J386 96J152 97C20 97C735 99N13 two Incisions
minute *ehrhorni* Col 03S68 74 conspicuous Plates much
shorter than lobes *coniferarum* Coc 98C201 *shastae*
03C74 equal or longer *rapax* Coms 81C307 82C65 83C22 84C34
87K347 349 359 375 558 90L173 489 91R487 93C27 93R214
94B363 379 01B236 *convexus* 90L22 174 *camilliae* 96M148

69 Signoret Ann Soc Ent Fr ix 69 Targioni Tozetti Cat
81 Comstock Rep U S Dept Agr 82 Chapin Rep Cal State
Bd Hort 83 Chapin ibid 84 Chapin ibid 85 Targioni
Tozetti Rev Bacc 87 Boggs et al Rep Cal State Bd Hort 87
Klee ibid 90 Lelong et al ibid 90 Riley Insect Life ii
91 Riley & Howard Insect Life iii 92 Craw et al Rep Cal
State Bd Hort 92 Riley & Howard Insect Life v 93
Coquillett Insect Life vi 93 Riley Insect Life v 94 Babcock
et al Rep Cal State Bd Hort 95 Howard Insect Life vii
96 Cockerell Psyche vii suppl i 96 Cockerell Bull U S Ent
Tech iv 96 Craw et al Rep Cal State Bd Hort 96 Johnson
Bull Ill State Lab N H iv 96 Johnson Ent News vii 96
Melville Rep Cal State Bd Hort 97 Cockerell Cal Fruit
Grower 97 Cooley Canad Ent xxix 97 Cockerell Bull U S
Ent Tech vi 97 Cockerell Proc U S Nat Mus xix 98
Cockerell Psyche viii 99 Cockerell Biol Cent Am ii 99
Cockerell Canad Ent xxxi 99 Newell Contr Iowa Agr Coll
iii 99 Pease et al Bull Cal State Bd Hort 01 Bosworth et
al ibid 02 Craw et al ibid 03 Coleman Journ N Y Ent Soc
xi 03 Fernald Bull Hatch Exp Sta lxxxviii
Greedy scale=A. *rapax*

99P 145 a Spinnerets wanting *perniciosus* Coms 81C304
 82C65 68 86 83C22 23 91 84C22 34 42 53 87B12 15 40 45 53
 220 344 351 359 362 366 370 379 389 404 477 558 565 88D91
 191 245 261 263 265 275 278 281 89R298 90R312 90R69 169
 90L22 120 283 333 390 468 473 480 483 486 489 90L12 39 65
 452 483 486 489 91R487 92C18 25 39 116 196 198 285 392 394
 92R53 93C251 93C27 93R280 294 94C97 100 102 146 358 365
 369 372 375 379 94R360 95H283 95R360 96C56 132 139 141 148
 160 99L56 76 102 153 155 157 01S217 242 02C193 220 226 229
 235 238 346 349 present Plates simple *juglansregiae* Coms
 81C300 93C61 90P335 96L108 148 01H226 03F265 toothed
 Two groups of spinnerets *abietus* Schr 03C74 Coccus
 1776S48 five groups *oestreaeformis* Curt 43C805 96C19
 four groups Large branching plates beyond third lobes
hederae Vall 03F260 *nerii* 81C301 83C61 83C22 84C34 88K263
 94C102 365 96C40 96M148 96T11 99P143 145 Chermes
hedrae 29V30 none *florencii* Col 03C66 74

Chrysomphalus Four groups of spinnerets *aonidum* Linn
 03F286 Coccus 1758L455 *Aspidiotus ficus* 90C481 92L197
 96M148 none Plates scarcely branched *tenebricosus* Coms
 03F294 *Aspidiotus* 81C308 strongly *aurantii* Mask 00M268
 03F287 *Aspidiotus* 78M199 81C293 83C21 84C34 87R49 52

1758 Linnaeus Syst Nat i 1776 Schrank Beitr Z Natur 29
 Vallot Mem Acad Dijon 43 Curtis Gard Chron iii 78 Mas-
 kell Trans New Zealand Inst xi 81 Comstock Rep U S Dept
 Agr 82 Chapin Rep Cal State Bd Hort 83 Chapin ibid 83
 Comstock Rep Cornell Dept Ent ii 84 Chapin Rep Cal
 State Bd Hort 87 Boggs et al ibid 87 Rose et al ibid 88
 Dwinell et al ibid 88 Klee ibid 89 Riley & Howard Insect
 Life i 90 Craw Rep Cal State Bd Hort 90 Lelong et al
 ibid 90 Packard Rep U S Ent Comm v 90 Riley Insect
 Life ii 90 Riley & Howard ibid iii 91 Riley & Howard
 ibid iii 92Craw et al Rep Cal State Bd Hort 92 Lelong ibid
 93 Coquillett Insect Life v 93 Coquillett ibid vi 93 Riley
 ibid v 94 Craw Rep Cal State Bd Hort 94 Riley & Howard
 Insect Life vi 95 Howard ibid vii 95 Riley & Howard ibid
 vii 96 Craw et al Rep Cal State Bd Hort 96 Cockerell Bull
 U S Div Ent Tech vi 96 Lelong et al Rep Cal State Bd
 Hort 96 Melville ibid 96 Townsend Bull U S Div Ent
 Tech iv 99 Pease et al Rep Cal State Bd Hort 00 Mar-
 latt Year Book U S Dept Agr 01 Hamilton et al Rep Cal
 State Bd Hort 01 Stewart et al ibid 02 Craw et al ibid
 03 Coleman Journ N Y Ent Soc xi 03 Fernald Bull Hatch
 Exp Sta lxxxviii

Red scale=A. *aurantii*

104 351 359 362 370 376 389 453 470 88C177 183 226 244 260
 277 89R299 90L22 163 284 333 337 420 469 472 480 485 489
 496 500 90L13 39 58 349 351 477 484 90R312 330 176 182
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