

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

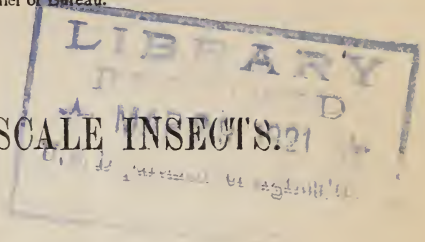


TECHNICAL SERIES No. 16.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

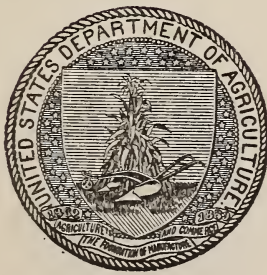
L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.



CONTENTS AND INDEX.

ISSUED FEBRUARY 7, 1921.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1921.

BUREAU OF ENTOMOLOGY

L. O. HOWARD, *Entomologist and Chief of Bureau.*

C. L. MARLATT, *Entomologist and Assistant Chief of Bureau.*

E. B. O'LEARY, *Assistant to Chief.*

A. J. LEISTER, *Chief Clerk.*

ROLLA P. CURRIE, *Editor.*

MABEL COLCORD, *Librarian.*

W. D. HUNTER, *Entomologist in Charge of Southern Field-Crop Insect Investigations.*

W. R. WALTON, *Entomologist in Charge of Cereal and Forage Insect Investigations.*

A. L. QUAINANCE, *Entomologist in Charge of Fruit Insect Investigations.*

F. H. CHITTENDEN, *Entomologist in Charge of Truck-Crop Insect Investigations.*

E. A. BACK, *Entomologist in Charge of Stored-Product Insect Investigations.*

A. D. HOPKINS, *Forest Entomologist in Charge of Forest Insect Investigations.*

E. F. PHILLIPS, *Apiculturist in Charge of Bee Culture Investigations.*

A. F. BURGESS, *Entomologist in Charge of Gipsy Moth and Brown-Tail Moth Investigations.*

CONTENTS.

	Page.
THE NATIONAL COLLECTION OF COCCIDÆ..... <i>C. L. Marlatt</i> ..	1
Historical summary.....	1
Recent work of the Bureau.....	4
Preservation of material.....	5
The slide collection.....	5
Recent additions and present status.....	6
Methods of study.....	7
The work of the future.....	9
A plea for the deposit of types.....	10
NEW SPECIES OF DIASPINE SCALE INSECTS..... <i>C. L. Marlatt</i> ..	11
Introductory.....	11
<i>Aspidiotus</i> (s. str.) <i>comperci</i>	12
<i>Aspidiotus</i> (s. str.) <i>meyeri</i>	13
<i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i>	14
<i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>africanus</i>	15
<i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>coursetiæ</i>	20
<i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>transcaspiensis</i>	21
<i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>epigææ</i>	21
<i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>mitchelli</i>	22
<i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>popularum</i>	23
<i>Aonidia juniperi</i>	24
<i>Aspidiotus</i> (<i>Targionia</i>) <i>chenopodii</i>	24
<i>Chionaspis micropori</i>	25
<i>Leucaspis indica</i>	26
<i>Mytilaspis chilopsidis</i>	27
<i>Parlatoria mangiferæ</i>	28
<i>Parlatoria pyri</i>	29
<i>Parlatoria chinensis</i>	30
CATALOGUE OF RECENTLY DESCRIBED COCCIDÆ—II..... <i>J. G. Sanders</i> ..	33
Subfamily Monophlebinæ.....	33
Subfamily Margarodinæ.....	34
Subfamily Ortheziinæ.....	35
Subfamily Conchaspinæ.....	35
Subfamily Dactylopiinæ.....	35
Subfamily Tachardiinæ.....	43
Subfamily Coccinæ.....	43
Subfamily Diaspinæ.....	48
Abbreviations of literature.....	59
CATALOGUE OF RECENTLY DESCRIBED COCCIDÆ—III..... <i>E. R. Sasser</i> ..	61
Subfamily Monophlebinæ.....	61
Subfamily Dactylopiinæ.....	62
Subfamily Coccinæ.....	65
Subfamily Diaspinæ.....	68

	Page.
THE GENUS <i>Fiorinia</i> IN THE UNITED STATES..... <i>E. R. Sasser</i> ..	75
Introduction.....	75
Description of the genus <i>Fiorinia</i>	75
<i>Fiorinia theæ</i> Green.....	76
<i>Fiorinia fioriniæ</i> Targioni Tozzetti.!	79
<i>Fiorinia fioriniæ minor</i> Maskell.....	79
<i>Fiorinia fioriniæ japonica</i> Kuwana.....	81
CATALOGUE OF RECENTLY DESCRIBED COCCIDÆ—IV..... <i>E. R. Sasser</i> ..	83
Subfamily Monophlebinae.....	83
Subfamily Ortheziinae.....	84
Subfamily Dactylopiinae.....	84
Subfamily Tachardiinae.....	87
Subfamily Coccinae.....	87
Subfamily Diaspinae.....	89
AN INDEX TO CATALOGUES OF RECENTLY DESCRIBED COCCIDÆ INCLUDED IN TECHNICAL SERIES NOS. 12 AND 16..... <i>E. R. Sasser</i> ..	99
INDEX.....	117

ILLUSTRATIONS.

	Page.
PLATE I. Anal plates of new scale insects. Fig. 1.— <i>Aspidiotus</i> (s. str.) <i>comperi</i> . Fig. 2.— <i>Aspidiotus</i> (s. str.) <i>meyeri</i>	12
II. Anal plates of new scale insects. Fig. 1.— <i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i> . Fig. 2.— <i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i>	14
III. Anal plates of new scale insects. Fig. 1.— <i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>africanus</i> . Fig. 2.— <i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>coursetiæ</i>	14
IV. Anal plates of new scale insects. Fig. 1.— <i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>transcaspensis</i> . Fig. 2.— <i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>epigææ</i>	22
V. Anal plates of new scale insects. Fig. 1.— <i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>mitchelli</i> . Fig. 2.— <i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>popularum</i>	22
VI. Anal plates of new scale insects. Fig. 1.— <i>Aonidia juniperi</i> . Fig. 2.— <i>Aspidiotus</i> (<i>Targionia</i>) <i>chenopodii</i>	24
VII. Anal plates of new scale insects. Fig. 1.— <i>Chionaspis micropori</i> . Fig. 2.— <i>Leucaspis indica</i>	26
VIII. Anal plates of new scale insects. Fig. 1.— <i>Mytilaspis chilopsidis</i> . Fig. 2.— <i>Parlatoria mangiferæ</i>	28
IX. Anal plates of new scale insects. Fig. 1.— <i>Parlatoria pyri</i> . Fig. 2.— <i>Parlatoria chinensis</i>	30
X. Anal plate of <i>Fiorinia theæ</i>	76
XI. Fig. 1.— <i>Fiorinia theæ</i> on leaf of <i>Camellia</i> . Fig. 2.— <i>Fiorinia theæ</i> on leaf of <i>Camellia</i>	76
XII. Anal plate of <i>Fiorinia fioriniæ</i>	80
XIII. Anal plate of <i>Fiorinia fioriniæ minor</i>	80

ERRATA.

- Page 59, line 47, for *Abzate* read *Alzate*.
 Page 80, line 16, for *Appolonias* read *Apollonias*.
 Page 85, line 8, for *chrysolepsis* read *chrysolepis*.

INDEX.

	Page.
<i>Abermoa rhizantha</i> , host of <i>Gymnaspiis aberemoæ</i>	70
<i>Abies</i> , infested by <i>Aspidiotus meyeri</i>	11
<i>Abies pectinata</i> , host of <i>Lecanium sericeum</i>	46
<i>Abies</i> sp., host of <i>Aspidiotus meyeri</i>	14, 53
<i>Abies veitchi</i> , host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Acacia arabica</i> —	
host of <i>Aonidia glandulosa</i>	91
host of <i>Ceroplastes africanus senegalensis</i>	44
host of <i>Lecaniodiaspis africanus</i>	84
host of <i>Pseudococcus perniciosus</i>	65
host of <i>Walkeriana cinerea</i>	34
<i>Acacia arabica</i> var. <i>nilotica</i> —	
host of <i>Antonina</i> (?) <i>africana</i>	43
host of <i>Aonidia glandulosa</i>	56
<i>Acacia cavenia</i> , host of <i>Tachardia argentina</i>	42
<i>Acacia horrida</i> , host of <i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>africanus</i>	16, 17, 51
<i>Acacia</i> (see also <i>Robinia pseudacacia</i>)—	
host of <i>Aspidiotus armatus</i>	83
host of <i>Icerya longisetosa</i>	84
host of <i>Pseudococcus coccineus</i>	64
<i>Acacia salicina</i> , host of <i>Crypthemichionaspis nigra</i>	91
<i>Acacia</i> sp., host of <i>Pseudaonidia junctiloba</i>	54
<i>Acacia tortilis</i> , host of <i>Ceroplastes africanus senegalensis</i>	44
<i>Acioa pallescens</i> , host of <i>Aspidiotus undulatus</i>	70
<i>Adenochlæna zeylanica</i> , host of <i>Inglisia castilloæ</i>	88
<i>Adiantum</i> sp., host of <i>Ripersia grandulifera</i>	87
<i>Adiscofiorinia</i> , characters of subgenus.....	75
<i>Agelaia fragrans</i> , host of <i>Pseudaonidia gracilis</i>	54
<i>Aglaiia minutiflora</i> —	
host of <i>Aonidia viridis</i>	92
host of <i>Lepidosaphes travancorensis</i>	95
<i>Albizzia lebbek</i> —	
host of <i>Ceroplastes subsphæricus</i>	88
host of <i>Pseudococcus perniciosus</i>	65
<i>Albizzia stipulata</i> , host of <i>Tachardia albizzia</i>	87
Almond, host of <i>Aspidiotus africanus</i>	18, 51
<i>Alnus glutinosa</i> , host of <i>Targionia alni</i>	55
<i>Alocasia macrorrhiza</i> , host of <i>Pseudococcus longipes</i>	41
<i>Aloe eru</i> , host of <i>Aspidiotus mammillaris</i>	93
<i>Alyssum mediterraneum</i> , host of <i>Macrocerococcus superbus</i>	38
“ <i>Amakebe</i> ,” host of <i>Ceroplastes ugandæ</i>	88
Anacardiaceæ, host of <i>Aspidiotus replicatus</i>	70
<i>Anamefiorinia</i> , characters of subgenus.....	75
<i>Anona muricata</i> , host of <i>Ceroplastes quadrilineatus</i>	66

	Page.
<i>Antherium acaule</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Antigonon</i> , host of <i>Pulvinaria antigoni</i>	43
<i>Antirrhinum latifolium</i> , host of <i>Macrocerooccus superbus</i>	38
Ants. (See <i>Aphenogaster testaceo-pilosus</i> , <i>Camponotus</i> sp., <i>Cremastogaster rogenhoferi</i> , <i>Pheidole pallidula</i> , <i>Solenopsis</i> sp., <i>Tapinoma erraticum</i> .)	
<i>Aonidia biafræ</i> , host of <i>Diaspis limuloides</i>	69
<i>Aonidia juniperi</i> , description	24
<i>Aphelinus</i> , parasite of San Jose scale	30
<i>Aphenogaster testaceo-pilosus</i> , associated with <i>Pseudococcus</i> (?) <i>cycliger</i>	40
<i>Apollonias canariensis</i> —	
host of <i>Aspidiotus lauretorum</i>	93
host of <i>Cryptaspidiotus aonidioides</i>	92
host of <i>Fiorinia fioriniæ</i>	80
Apple (see also <i>Pyrus malus</i>)—	
host of <i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>africanus</i>	17, 51
host of <i>Lecanium glandi</i>	46
host of <i>Parlatoria pyri</i>	11, 58
Apricot, host of <i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>africanus</i>	17, 51
<i>Aralia</i> , host of <i>Fiorinia fioriniæ</i>	80
Arbutus, trailing. (See <i>Epigæa repens</i> .)	
<i>Arbutus unedo</i> , host of <i>Targionia vitis arbutus</i>	71
<i>Arctostaphylos viscida</i> , host of <i>Aspidiotus arctostaphyli</i>	69
<i>Areca aurea</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Argyranthemum frutescens</i> —	
host of <i>Aspidiotus canariensis</i>	92
host of <i>Pseudococcus aridorum</i>	86
<i>Artemisia californica</i> , host of <i>Pseudococcus artemisiæ</i>	40
<i>Artemisia</i> sp., host of <i>Eriococcus catalinæ</i>	37
<i>Arthrocnemum macrostachyum</i> , host of <i>Chionaspis arthrocnemi</i>	89
<i>Artocarpus integrifolia</i> , host of <i>Monaphlebus stebbingi octocaudata</i>	33
<i>Artocarpus</i> sp., host of <i>Cryptoparlatoea uberifera</i>	95
<i>Arundinaria</i> sp.—	
host of <i>Aclerda distorta</i>	67
host of <i>Asterolecanium flavociliatum</i>	62
host of <i>Asterolecanium lanceolatum</i>	62
host of <i>Asterolecanium pudibundum</i>	62
<i>Aspidiotiphagus citrinus</i> , parasite of <i>Fiorinia fioriniæ</i>	80
<i>Aspidiotus africanus</i> , importance	11
<i>Aspidiotus</i> (<i>Aonidiella</i>) <i>aurantii</i> , relation to <i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i>	15
<i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i> , description	14-15
<i>Aspidiotus camelliæ</i> , similarity to <i>Aspidiotus comperei</i>	13
<i>Aspidiotus</i> (<i>Chrysomphalus</i>) <i>dictyospermi</i> , relation to <i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i>	15
<i>Aspidiotus cocotiphagus</i> , danger from	11
<i>Aspidiotus comperei</i> , description	12-13
<i>Aspidiotus destructor</i> , similarity to <i>Aspidiotus comperei</i>	13
<i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>africanus</i> , description	15-16
<i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>coursetiæ</i> , description	20
<i>Aspidiotus</i> (<i>Diaspidiotus</i>) <i>transcaspensis</i> , description	21
<i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>epigææ</i> , description	21-22
<i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>mitchelli</i> , description	22-23
<i>Aspidiotus</i> (<i>Hemiberlesia</i>) <i>popularum</i> , description	23-24

	Page.
<i>Aspidiotus meyeri</i> —	
description.....	13-14
host plant.....	11
<i>Aspidiotus subsimilis</i> , relation to <i>Aspidiotus (Diaspidiotus) coursetiæ</i>	20
<i>Aspidiotus (Targionia) chenopodii</i> , description.....	24-25
<i>Atalanta zeylanica</i> , host of <i>Fiorinia atalantiæ</i>	50
<i>Atica obscura</i> , host of <i>Ischnaspis spathulata</i>	95
<i>Atriplex canescens</i> , host of <i>Atriplicia gallicola</i>	37
<i>Atriplex lampa</i> —	
host of <i>Ceroplastes breviseta</i>	88
host of <i>Eriococcus parcispinosus</i>	85
host of <i>Luzulaspis spinulosa</i>	87
host of <i>Orthezia varipes</i>	84
<i>Averrhoa carambola</i> , host of <i>Inglisia conchiformis</i>	68
<i>Azadirachta indica</i> , host of <i>Lecaniodiaspis azadirachtæ</i>	63
<i>Baccharis rosmarinifolia</i> —	
host of <i>Cerococcus badius</i>	84
host of <i>Lecanium resinatum</i>	67
<i>Bæckia pinifolia</i> , host of <i>Fiorinia neo-caledonica</i>	91
<i>Bahia</i> sp.—	
host of <i>Eriococcus bahiæ</i>	37
host of <i>Orthezia californica</i>	35
<i>Balanites (Agiatida) ægyptiaca</i> , host of <i>Houardia troglodytes</i>	47
<i>Balanites</i> sp., host of <i>Aspidiotus vuilleti</i>	53
Bamboo (see also <i>Dendrocalamus</i> sp.)—	
host of <i>Asterolecanium exiguum</i>	62
host of <i>Asterolecanium tenuissimum</i>	63
host of <i>Asterolecanium tumidum</i>	63
host of <i>Asterolecanium udagamæ</i>	63
host of <i>Fiorinia fioriniæ</i>	80
host of <i>Pseudococcus (?) takæ</i>	41
<i>Bambusa</i> sp., host of <i>Asterolecanium rubrocomatum</i>	63
<i>Bandeiræa speciosa</i> , host of <i>Pseudaonidia silvatica</i>	54
“Banian” tree. (See <i>Ficus</i> sp.)	
<i>Baobabrinde</i> , host of <i>Pseudococcus obtusus</i>	86
Bark-tree, African. (See <i>Ficus</i> sp.)	
<i>Barteria fistulosa</i> , host of <i>Stictococcus formicarius</i>	64
Bay, host of <i>Fiorinia fioriniæ</i>	80
<i>Berlinia</i> , host of <i>Lepidosaphes chitinosus</i>	71
<i>Betula glandulosa</i> , host of <i>Pulvinaria occidentalis subalpina</i>	66
<i>Billartia officinalis</i> , host of <i>Aonidia picea</i>	56
<i>Bletia</i> sp., host of <i>Chrysomphalus portoricensis</i>	70
<i>Bocagea obliqua</i> , host of <i>Lecaniodiaspis malaboda</i>	63
“Bois la fumeé,” host of <i>Ceroplastes tenuitectus</i>	44
<i>Bosquiea cerasiflora</i> , host of <i>Aspidiotus fissidens pluridentatus</i>	93
<i>Boswellia</i> , host of <i>Phenacoccus iceryoides</i>	39
<i>Brachystegia randii</i> , host of <i>Aspidioproctus maximus</i>	83
<i>Bulvesia retana</i> —	
host of <i>Dinaspis lahillei</i>	95
host of <i>Icerya subandina</i>	84
Bunch-grass, host of <i>Ripersiella kelloggi</i>	41
Cacao—	
host of <i>Ceroplastes bussei</i>	44
host of <i>Palæococcus theobromæ</i>	34

	Page.
Cacao—Continued.	
host of <i>Pulvinaria jacksoni</i>	44
host of <i>Stictococcus dimorphus</i>	64
Cactaceæ. (See <i>Opuntia ficus-indica</i> and <i>O. aurantiaca</i> .)	
<i>Cajanus indicus</i> , host of <i>Ceroplastodes chiton</i>	45, 66
<i>Callitris quadrivalvis</i> , host of <i>Cryptaspidotus mediterraneus</i>	71
<i>Calluna vulgaris</i> —	
host of <i>Aspidiotus bavaricus</i>	92
host of <i>Lecanium pulchrum</i>	46
Camellia—	
host of <i>Fiorinia fioriniæ</i>	80
host of <i>Fiorinia theæ</i>	78
<i>Camellia japonica</i> , host of <i>Fiorinia theæ</i>	76
<i>Camponotus</i> sp., nests infested with <i>Pseudococcus myrmecarius</i>	41
<i>Campylanthus solsoloides</i> , host of <i>Targionæ</i> (?) <i>campylanthi</i>	94
<i>Capparis horrida</i> , host of <i>Phenacoccus iceryoides</i>	39
<i>Carissa</i> sp., host of <i>Cerococcus ornatus</i>	63
<i>Caryola</i> sp., host of <i>Fiorinia theæ</i>	78
<i>Cassia floribunda</i> , host of <i>Chionaspis cassiæ</i>	89
<i>Cassia</i> sp., host of <i>Ceroplastodes chiton</i>	66
<i>Castilleja elastica</i> —	
host of <i>Inglisia castilloæ</i>	88
host of <i>Pseudococcus crotonis</i>	86
<i>Casuarina glauca</i> , host of <i>Aonidia</i> (?) <i>paradoxa</i>	92
Catalogue of recently described Coccidæ.....	33-60, 61-74, 83-97
<i>Cecropia adenopus</i> , host of <i>Lachniella cecropiæ</i>	40, 86
<i>Celtis mauritiana</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Celtis occidentalis</i> , host of <i>Targionia celtis</i>	71
<i>Celtis sinensis</i> , host of <i>Coccus celtium</i>	66
<i>Cercidium andicola</i> , host of <i>Ceroplastes subrotundus</i>	88
<i>Cereus</i> , host of <i>Aspidiotus eglandulosus</i>	52
<i>Cetarach officinalis</i> , host of <i>Macrocerococcus superbus</i>	38
Chaff scale. (See <i>Parlatoria pergandei</i> .)	
<i>Chamærops humuli</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Chenopodium</i> —	
host of <i>Aspidiotus</i> (<i>Targionia</i>) <i>chenopodii</i>	25
host of <i>Targionia chenopodii</i>	55
<i>Chermes arecæ</i> , synonym of <i>Fiorinia fioriniæ</i>	79
<i>Chilocorus bivulnerus</i> , enemy of <i>Fiorinia theæ</i>	79
<i>Chilopsis linearis</i> —	
host of <i>Lepidosaphes chilopsidis</i>	57
probable host of <i>Mytilaspis chilopsidis</i>	28
<i>Chionaspis micropori</i> , description.....	25-26
Christ's thorn. (See <i>Zizyphus spinachristi</i> .)	
<i>Chrysophyllum stuhlmannii</i> , host of <i>Aspidiotus fissidens pluridentatus</i>	93
<i>Cinnamomum zeylanicum</i> , host of <i>Aulacaspis tubercularis</i>	49
Citronella grass, host of <i>Lecanium tenuivalvatum</i>	89
<i>Citrus</i> , host of <i>Fiorinia theæ</i>	78
<i>Citrus</i> sp.—	
host of <i>Pulvinaria ixoræ</i>	66
host of <i>Takahashia citricola</i>	68
<i>Citrus trifoliata</i> , host of <i>Aspidiotus</i> (<i>Aonidiella</i>) <i>cocotiphagus</i>	15
<i>Clusia</i> sp., host of <i>Gymnaspis clusiæ</i>	56
<i>Cneorum pulverulentum</i> , host of <i>Chionaspis canariensis</i>	89

	Page.
Coccidæ, national collection.....	1-10
(See also National collection of Coccidæ.)	
Cocoanut (see also <i>Cocos nucifera</i>)—	
host of <i>Asterolecanium lineare</i>	35
infested by <i>Aspidiotus cocotiphagus</i>	11
Cocoanut palm—	
host of <i>Chionaspis inday</i>	48
host of <i>Fiorinia fioriniæ</i>	80
host of <i>Paralecanium cocophyllæ</i>	47
<i>Cocos nucifera</i> —	
host of <i>Aspidiotus (Aonidiella) cocotiphagus</i>	15, 51
host of <i>Aspidiotus varians</i>	94
host of <i>Chrysomphalus proprosimus</i>	55
host of <i>Cryptaspisidus nucum</i>	91
host of <i>Lepidosaphes mcgregori</i>	57
host of <i>Lepidosaphes unicolor</i>	58
host of <i>Parlatoria greeni</i>	58
<i>Codiaeum variegatum</i> , host of <i>Pseudococcus crotonis</i>	86
<i>Coffea arabica</i> —	
host of <i>Asterolecanium coffeæ</i>	84
host of <i>Cerococcus ornatus</i>	63
<i>Coffea</i> , host of <i>Ceroplastes vinsonioides</i>	88
Coffee, Liberian—	
host of <i>Coccus hesperidum javanensis</i>	45
host of <i>Pseudococcus coffeæ</i>	40
<i>Coleus</i> , host of <i>Pseudococcus citri coleorum</i>	40
<i>Connarus smeathmanni</i> , host of <i>Diaspis africana</i>	68
<i>Copaifera guibourtiana</i> (?), host of <i>Chionaspis vUILLETI</i>	48
<i>Cordia lineata</i> , host of <i>Tachardia cordaliæ</i>	87
Cotton. (See <i>Gossypium</i> sp.)	
Cottonwood (see also <i>Populus</i> sp.)—	
host of <i>Aspidiotus (Hemiberlesia) popularum</i>	23
<i>Coursetia glandulosa</i> , host of <i>Aspidiotus (Diaspidiotus) coursetiæ</i>	20, 52
Crab-apple, host of <i>Parlatoria chinensis</i>	31
<i>Cremastogaster</i> near <i>kneri</i> , associated with <i>Houardia troglodytes</i>	47
<i>Cremastogaster rogenhoferi</i> , attending <i>Phenacoccus hirsutus</i>	39
"Croton," host of <i>Lepidosaphes auriculata</i>	56
<i>Croton lacciferum</i> , host of <i>Tachardia albizziæ</i>	87
<i>Croton majesticum</i> , host of <i>Lepidosaphes serrifrons</i>	57
<i>Croton tiglium</i> , host of <i>Pulvinaria burkilli</i>	43
<i>Croton undulatum</i> , host of <i>Lepidosaphes serrifrons</i>	57
<i>Croton</i> , variegated. (See <i>Codiaeum variegatum</i> .)	
<i>Crudia zenkeri</i> —	
host of <i>Aonidia biafræ</i>	70
host of <i>Lepidosaphes crudix</i>	72
<i>Cupressus</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Cupressus macrocarpa</i> —	
host of <i>Pseudococcus cupressi</i>	40
host of <i>Sphærococcus cupressi</i>	85
host of <i>Xylococcus macrocarpa</i>	35
<i>Cuviera angolensis</i> , host of <i>Stictococcus formicarius</i>	64
<i>Cybocephalus nigrifolius</i> , enemy of <i>Fiorinia theæ</i>	79

	Page.
<i>Cyclostemon bipindensis</i> , host of <i>Ischnaspis bipendensis</i>	71
<i>Cycas circinalis</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Cycas revoluta</i> , host of <i>Fiorinia fioriniæ</i>	79, 80
<i>Cynodon</i> sp., host of <i>Margarodes mediterraneus</i>	34
<i>Cynometra</i> sp.—	
host of <i>Aonidia biafræ</i>	70
host of <i>Diaspis limuloides</i>	69
host of <i>Lepidosaphes aberrans</i>	71
host of <i>Lepidosaphes tenuior</i>	72
<i>Cytisus filiper</i> , host of <i>Chionaspis canariensis</i>	89
<i>Cytisus prolifer</i> var. <i>palmensis</i> , host of <i>Pseudococcus aridorum</i>	86
<i>Dactylis glomerata</i> , host of <i>Ceroputo volynicus</i>	39
<i>Dalbergia sissu</i> , host of <i>Monophlebus stebbingi octocaudata</i>	33
Date palm, host of <i>Sphærococcus draperi</i>	38
Date-palm scale. (See <i>Parlatoria blanchardi</i> .)	
<i>Davallia</i> sp., host of <i>Lepidosaphes ocellata</i>	57
<i>Dendrocalamus giganteus</i> , host of <i>Asterolecanium coronatum</i>	62
<i>Dendrocalamus</i> sp., host of <i>Asterolecanium miliaris robusta</i>	35
Diaspinæ, order followed in describing.....	8
<i>Diaspis fioriniæ</i> , synonym of <i>Fiorinia fioriniæ</i>	79
<i>Dichapetalum</i> sp., host of <i>Aspidiotus mæandrius</i>	69
<i>Distichlis</i> sp., host of <i>Eriococcus salinus</i>	85
<i>Dracæna draco</i> —	
host of <i>Aspidiotus lauretorum</i>	93
host of <i>Aspidiotus tinerfensis</i>	94
<i>Dracæna indivisa</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Dracæna</i> sp., host of <i>Phenacaspis tangana</i>	90
<i>Ehretia cymosa</i> , host of <i>Aspidiotus replicatus</i>	70
Elder. (See <i>Sambucus glauca</i> .)	
<i>Elymus condensatus</i> , host of <i>Ripersia smithii</i>	65
<i>Ephedra altissima</i> —	
host of <i>Aspidiotus trabuti</i>	53
host of <i>Stotzia striata</i>	44
<i>Ephedra andina</i> , host of <i>Dinaspis ichesii</i>	95
<i>Ephedra corsoniana</i> , host of <i>Leucaspis ephedræ</i>	50
<i>Ephedra intermedia</i> , host of <i>Parlatoria ephedræ</i>	95
<i>Ephedra nebiodensis</i> , host of <i>Parlatoria ephedræ</i>	95
<i>Ephedra nebiodensis</i> var. <i>procera</i> , host of <i>Parlatoria ephedræ</i>	95
<i>Epigæa repens</i> , host of <i>Aspidiotus (Hemiberlesia) epigææ</i>	22, 52
<i>Erica arborea</i> , host of <i>Diaspis(?) ericicola</i>	48
<i>Erica tetralix</i> , host of <i>Aspidiotus bavaricus</i>	92
<i>Eriogonum stellatum</i> , host of <i>Eriococcus eriogoni</i>	85
<i>Erythrina lithosperma</i> , host of <i>Pseudococcus crotonis</i>	86
<i>Euphorbia aphylla</i> , host of <i>Aspidiotus taorensis</i>	94
Euphorbiaceæ—	
host of <i>Diaspis conservans</i>	69
host of <i>Pseudaonidia ferox</i>	54
<i>Euphorbia regis-jubæ</i> —	
host of <i>Aspidiotus taorensis</i>	94
host of <i>Diaspis barrancorum</i>	90
<i>Euphorbia</i> sp.—	
host of <i>Aspidiotus fissus</i>	93
host of <i>Aspidiotus tectarius</i>	94

	Page.
<i>Euphorbia</i> sp.—Continued.	
host of <i>Cryptaspidiotus austro-africanus</i>	92
host of <i>Pseudaonidia magna</i>	54
<i>Euphorbia virosa</i> , host of <i>Aspidiotus euphorbiæ</i>	93
<i>Eurya ochracea</i> , host of <i>Coccus ochraceæ</i>	67
<i>Fabiana denudata</i> —	
host of <i>Ceroplastes longiseta</i>	88
host of <i>Targionia fabianæ</i>	94
Ferns, food plant of <i>Fiorinia fioriniæ</i>	80
<i>Festuca</i> sp., host of <i>Trionymus californicus</i>	86
<i>Ficus bengalensis</i> , host of <i>Monophlebus stebbingi octocaudata</i>	33
<i>Ficus carica</i> —	
host of <i>Eriococcus lagerstræmiæ</i>	37
host of <i>Monophlebus stebbingi octocaudata</i>	33
<i>Ficus elastica</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Ficus glomerata</i> —	
host of <i>Hemichionaspis fici</i>	49
host of <i>Monophlebus stebbingi octocaudata</i>	33
<i>Ficus indica</i> , host of <i>Pseudaonidia silvatica</i>	54
<i>Ficus infectoria</i> , host of <i>Monophlebus stebbingi octocaudata</i>	33
<i>Ficus religiosa</i> , host of <i>Monophlebus stebbingi octocaudata</i>	33
<i>Ficus</i> sp.—	
host of <i>Ceroplastes ficus</i>	65
host of <i>Ceroplastes gowdeyi</i>	88
host of <i>Ceroplastes quadrilineatus</i>	66
host of <i>Chionaspis manni</i>	48
host of <i>Fiorinia fioriniæ</i>	80
host of <i>Hemichionaspis minima</i>	49
host of <i>Lecaniodiaspis africana</i>	84
host of <i>Pulvinaria jacksoni</i>	44
Fig, host of <i>Aspidiotus (Diaspidiotus) africanus</i>	16, 17, 18, 19, 51
<i>Filicium decipiens</i> , host of <i>Tachardia albizziæ</i>	87
<i>Fiorinia</i> , article.....	75-82
<i>Fiorinia camelliæ</i> , synonym of <i>Fiorinia fioriniæ</i>	76
<i>Fiorinia fioriniæ</i> —	
bibliography.....	79
description.....	80-81
discussion of synonymy.....	79-80
distribution.....	80
enemies.....	80
hosts.....	80
in table of species.....	76
<i>Fiorinia fioriniæ japonica</i> —	
bibliography.....	81
description.....	82
in table of species.....	76
<i>Fiorinia fioriniæ</i> var. <i>camelliæ</i> , synonym of <i>Fiorinia theæ</i>	77
<i>Fiorinia fioriniæ</i> var. <i>minor</i> , comparison with <i>Fiorinia fioriniæ</i>	79-80
<i>Fiorinia palmæ</i> , synonym of <i>Fiorinia fioriniæ</i>	79
<i>Fiorinia pellucida</i> , synonym of <i>F. fioriniæ</i>	79
<i>Fiorinia</i> , generic characters.....	75-76
<i>Fiorinia theæ</i> —	
bibliography.....	76
distribution.....	78

<i>Fiorinia theæ</i> —Continued.	Page.
eggs.....	78
enemies.....	79
female.....	78
food plants.....	78
in table of species.....	76
scale of female.....	77
scale of male.....	77-78
<i>Fiscus</i> sp., host of <i>Tachardia longisetosa</i>	87
<i>Fumaria major</i> , host of <i>Macrocerococcus superbus</i>	38
Fungus, associated with <i>Phenacaspis lutea</i>	90
<i>Furcraea gigantia</i> , host of <i>Aspidiotus furcraëicola</i>	93
<i>Garcinia</i> sp. host of <i>Fiorinia fioriniæ</i>	80
<i>Gelonium lanceolatum</i> , host of <i>Inglisia chelonioides</i>	68
<i>Gigantochloa aspera</i> , host of <i>Asterolecanium coronatum</i>	62
<i>Gleditsia triacanthos</i> , host of <i>Aspidiotus (Diaspidiotus) africanus</i>	17, 18, 51
<i>Gnetum leyboldi</i> , host of <i>Pseudoparlatoria cristata</i>	71
<i>Gnetum scandens</i> , host of <i>Parlatoria hastata</i>	95
<i>Gossypium hirsutum</i> , host of <i>Hemichionaspis fici</i>	49
<i>Gossypium</i> sp.—	
host of <i>Cerococcus hibisci</i>	36
host of <i>Pseudococcus perniciosus</i>	65
<i>Gourliea decorticans</i> , host of <i>Pseudococcus percerosus</i>	86
Grasses (Graminaceæ)—	
host of <i>Orthezia martelli</i>	35
host of <i>Phenacoccus graminicola</i>	39
Grass (see also <i>Distichlis</i> sp.)—	
host of <i>Odonaspis graminis</i>	55
host of <i>Odonaspis ruthæ</i>	56
host of <i>Pseudococcus aridorum</i>	86
host of <i>Walkeriana africana</i>	61
<i>Grewia microcos</i> , host of <i>Inglisia castilloæ</i>	88
<i>Grewia</i> sp., host of <i>Fiorinia tumida</i>	51
Ground laurel. (See <i>Epigæa repens</i> .)	
Guava. (See <i>Psidium guava</i> .)	
“Gum-trees,” host of <i>Ceronema caudata</i>	43
<i>Gymnosporia cassinoides</i> —	
host of <i>Aspidiotus gymnosporiæ</i>	93
host of <i>Aspidiotus lauretorum</i>	93
<i>Gymnosporia montana</i> , host of <i>Coccus gymnospori</i>	45
<i>Hakea gibbosa</i> , host of <i>Palæococcus rosæ australis</i>	34
<i>Hake</i> sp., host of <i>Aspidiotus comperei</i>	13, 152
<i>Haloxyton ammodendron</i> , host of <i>Pulvinaria orientalis</i>	44
“Hariali” grass, host of <i>Antonina indica</i>	43
<i>Harogana madagascariensis</i> , host of <i>Inglisia conchiformis</i>	68
<i>Harpullia cupanioides</i> , host of <i>Tachardia albizziæ</i>	87
<i>Heberdenia excelsa</i> , host of <i>Aspidiotus lauretorum</i>	93
<i>Hedera helix canariensis</i> , host of <i>Aspidiotus lauretorum</i>	93
<i>Hedera helix</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Helianthemum kahiricum</i> , host of <i>Cerococcus eremobius</i>	36
<i>Helicteres isora</i> , host of <i>Cerococcus indicus</i>	63
Hemlock, Japanese (see also <i>Tsuga</i> sp.)—	
host of <i>Fiorinia fioriniæ japonica</i>	82

	Page.
<i>Hevea brasiliensis</i> —	
host of <i>Asterolecanium pustulans seychellarum</i>	62
host of <i>Lepidosaphes fasciata</i>	94
<i>Hibiscus</i> , host of <i>Parlatoria chinensis</i>	31, 58
<i>Hibiscus liliflorus</i> , host of <i>Cerococcus hibisci</i>	36
Honey locust. (See <i>Gleditsia triacanthos</i> .)	
<i>Hyalis argentea</i> , host of <i>Pseudococcus mendozinus</i>	86
<i>Hypericum coris</i> , host of <i>Aspidiotus privignus</i>	53
<i>Ilex canariensis</i> , host of <i>Aspidiotus lauretorum</i>	93
<i>Ilex platyphylla</i> , host of <i>Aspidiotus lauretorum</i>	93
<i>Ilex</i> sp.—	
host of <i>Aulacaspis penzigi</i>	49
host of <i>Palæococcus pulcher</i>	34
host of <i>Pinnaspis javanica</i>	49
<i>Illigera pentophylla</i> , host of <i>Aspidiotus replicatus</i>	70
Index to catalogues of recently described Coccidæ.....	99-116
Japanese quince, host of <i>Fiorinia fioriniæ</i>	80
<i>Juglans regia</i> , host of <i>Pseudococcus bakeri</i>	64
<i>Juniperus bermudiana</i> , host of <i>Fiorinia juniperi</i>	51
<i>Juniperus communis</i> , host of <i>Pseudococcus rovaræ</i>	41
<i>Juniperus phœnicea</i> —	
host of <i>Cryptaspidiotus mediterraneus</i>	71
host of <i>Diaspis atlantica</i>	90
<i>Juniperus</i> sp., host of <i>Aonidia juniperi</i>	24, 56
<i>Juniperus virginiana</i> , host of <i>Pseudococcus juniperi</i>	40
Jujube, host of <i>Parlatoria chinensis</i>	31
<i>Justicia alba</i> , host of <i>Chionaspis longispina</i>	89
<i>Kentia belmoreana</i> , host of <i>Fiorinia fioriniæ</i>	79, 80
<i>Kentia</i> , host of <i>Fiorinia fioriniæ</i>	79
<i>Kentia fosteriana</i> , host of <i>Fiorinia fioriniæ</i>	80
Kieffer pear, infested by <i>Aspidiotus (Diaspidiotus) africanus</i>	18
“Kxuibes,” host of <i>Monophlebus africanus</i>	83
<i>Lagerstrœmia indica</i> , host of <i>Eriococcus lagerstrœmiæ</i>	37
<i>Landolphia</i> sp., host of <i>Tachardia albizziæ</i>	87
<i>Larix</i> sp., host of <i>Fiorinia fioriniæ</i>	80
<i>Larrea cuneata</i> —	
host of <i>Birchippia americana</i>	85
host of <i>Ceroplastes irregularis</i>	88
host of <i>Gymnococcus lahillei</i>	85
host of <i>Lecanium elegans</i>	89
host of <i>Protargionia larreæ</i>	94
<i>Larrea divaricata</i> —	
host of <i>Birchippia americana</i>	85
host of <i>Gymnococcus lahillei</i>	85
host of <i>Lecanium elegans</i>	89
host of <i>Protargionia larreæ</i>	94
<i>Lasius flavus</i> , associated with <i>Ripersia formicarii</i>	42
Lauraceæ, hosts of <i>Aspidiotus lauretorum</i>	93
<i>Laurus canariensis</i> —	
host of <i>Aspidiotus lauretorum</i>	93
host of <i>Cryptaspidiotus aonidioides</i>	92
host of <i>Pulvinaria plana</i>	87
<i>Lawsonia alba</i> , host of <i>Walkeriana cinerea</i>	34
Lebbek. (See <i>Albizzia lebbek</i> .)	

	Page.
<i>Ledum grœnlandicum</i> , host of <i>Pseudococcus ledi</i>	86
<i>Lepidium draba</i> , host of <i>Macrocerococcus superbus</i>	38
<i>Lepidosaphes lasianthi</i> , associated with <i>Fiorinia theæ</i>	78
<i>Leptospermum</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Leucaspis indica</i> —	
attacking mango.....	11
description.....	26-27
<i>Licula</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Livistona</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Loranthus</i> sp.—	
host of <i>Diaspis barberi</i>	48
host of <i>Lepidosaphes kamerunensis</i>	72
<i>Loranthus undulatus</i> var. <i>sagittifolius</i> , host of <i>Diaspis parva</i>	90
<i>Lotus</i> , host of <i>Macrocerococcus superbus</i>	38
<i>Lycium chilense</i> —	
host of <i>Pulvinaria argentina</i>	87
host of <i>Tachardia lycii</i>	87
<i>Macrobium palisoti</i> , host of <i>Lepidosaphes meridionalis</i>	72
<i>Macrobium</i> sp., host of <i>Phenacaspis bussii</i>	90
<i>Macrobium zenkeri</i> , host of <i>Diaspis hamala</i>	69
“Malaboda.” (See <i>Myristica laurifolia</i> .)	
<i>Mallotus philippinensis</i> , host of <i>Cryptoparlatores uberifera</i>	95
Mango—	
attacked by <i>Leucaspis indica</i> and <i>Parlatoria mangiferæ</i>	11
host of <i>Aulacaspis cinnamoni mangiferæ</i>	90
host of <i>Icerya minor</i>	34
host of <i>Leucaspis indica</i>	27, 50
host of <i>Monophlebus stebbingi octocaudata</i>	33
host of <i>Parlatoria mangiferæ</i>	29
host of <i>Phenacoccus iceryoides</i>	39
host of <i>Pseudaonidia greeni</i>	54
<i>Mangosteen</i> , host of <i>Pseudaonidia greeni</i>	54
<i>Manihot glazionii</i> , host of <i>Stigmacoccus zimmermanni</i>	83
“Margosa.” (See <i>Azadirachta indica</i> .)	
MARLATT, C. L.—	
paper, “New Species of Diaspine Scale Insects”.....	11-97
paper, “The National Collection of Coccidæ”.....	1-10
<i>Menispermum canadense</i> , host of <i>Lecanium cecconi</i>	46
<i>Mesembryanthemum edule</i> , host of <i>Pseudaonidia lounsburyi</i>	54
<i>Mesua ferrea</i> , host of <i>Aonidia perplexa</i>	56
<i>Micromeria ericifolia</i> , host of <i>Chionaspis canariensis</i>	89
<i>Micromeria linki</i> , host of <i>Chionaspis canariensis</i>	89
<i>Micromeria</i> sp., host of <i>Chionaspis canariensis</i>	89
<i>Micromeria teneriffæ</i> , host of <i>Chionaspis canariensis</i>	89
<i>Micromeria terebinthacea</i> , host of <i>Chionaspis canariensis</i>	89
<i>Microwisea misella</i> , enemy of <i>Fiorinia theæ</i>	79
<i>Miliusa velutina</i> , host of <i>Aonidia</i> (?) <i>targioniopsis</i>	92
Mimosa. (See <i>Acacia horrida</i> .)	
<i>Mimusops hexandra</i> , host of <i>Aonidia spinosissima</i>	70
<i>Miscanthus</i> sp.—	
host of <i>Lepidosaphes arii</i>	71
host of <i>Ripersia agasawarensis</i>	65
host of <i>Ripersia japonica</i>	42

	Page.
<i>Mitragyne macrophylla</i> —	
host of <i>Aspidiotus replicatus</i>	70
host of <i>Diaspis pugionifera</i>	68
<i>Morus rubra</i> , host of <i>Aspidiotus mori</i>	64
<i>Morus</i> sp.—	
host of <i>Lecanium mori</i> var. <i>somereni</i>	67
host of " <i>Lecanium</i> " <i>nishigaharæ</i>	47
M'sasa tree. (See <i>Brachystegia randii</i> .)	
<i>Myristica hypargyræa</i> , host of <i>Chrysomphalus samoana</i>	93
<i>Myristica laurifolia</i> , host of <i>Lecaniodiaspis malaboda</i>	63
<i>Mytilaspis chilopsidis</i> , description.....	27-28
Mulberry (see also <i>Morus</i> sp.)—	
host of <i>Pulvinaria kuwacola</i>	44
<i>Murraya exotica</i> , host of <i>Fiorinia rubrolineata</i>	51
National collection of Coccidæ—	
historical summary.....	1-4
methods of study.....	7-9
plea for the deposit of types.....	10
preservation of material.....	5
recent additions and present status.....	6-7
recent work of the Bureau of Entomology.....	4-6
slide collection.....	5-6
work of the future.....	9-10
<i>Nephelium longana</i> , host of <i>Fiorinia hirsuta</i>	51
Non-diaspine Coccidæ, order followed in description.....	9
<i>Nothofagus dombeyi</i> , host of <i>Fagisuga triloba</i>	35
"Obarus," host of <i>Chionaspis subnudata</i>	90
<i>Odina woodice</i> , host of <i>Fiorinia odinæ</i>	51
Oil palm. (See <i>Elæis guineensis</i> .)	
<i>Olea glandulifera</i> , host of <i>Fiorinia theæ</i>	77, 78
Olive (see also <i>Olea glandulifera</i>)—	
host of <i>Euphilippia olivina</i>	44
host of <i>Lepidosaphes beckii oleæ</i>	56
host of <i>Phenacoccus oleæ</i>	64
<i>Ophryoporus andinus</i> , host of <i>Aspidiotus argentina</i>	92
Opuhe. (See <i>Urera sandwichensis</i> .)	
<i>Opuntia aurantiaca</i> , host of <i>Dactylopius argentinus</i>	38
<i>Opuntia dillenii</i> , host of <i>Dactylopius ceylonicus</i>	38
<i>Opuntia ficus indica</i> , host of <i>Dactylopius argentinus</i>	38
<i>Opuntia</i> , host of <i>Pseudococcus obscurus</i>	41
Orange—	
host of <i>Aspidiotus cocotiphagus</i>	11
host of <i>Chionaspis sassceri</i>	68
host of <i>Parlatoria cinerea</i>	58
Orange tree (<i>Citrus</i>), host of <i>Icerya okadæ</i>	34
<i>Oreodaphne fœtens</i> , host of <i>Aspidiotus lauretorum</i>	93
<i>Ormosia laxiflora</i> , host of <i>Ceroplastes vuilleti</i>	45
<i>Oryza</i> , host of <i>Ripersia</i> (?) <i>oryzæ</i>	42
<i>Osirys alba</i> , host of <i>Aspidiotus ceconi</i>	51
<i>Osmanthus</i> , host of <i>Lepidosaphes uniloba</i>	72
<i>Ostodes</i> , host of <i>Fiorinia theæ</i>	78
<i>Oxytenanthera thwaitesii</i> , host of <i>Asterolecanium ceriferum prominens</i>	62

Palm—	Page.
host of <i>Asterolecanium ceriferum</i>	62
host of <i>Chionaspis substriata</i>	68
host of <i>Pseudaonidia kamerunica</i>	54
<i>Parinarium gabunense</i> , host of <i>Aspidiotus fissidens</i>	69
<i>Parlatoria affinis</i> , infesting unknown plant in Egypt.....	31
<i>Parlatoria blanchardi</i> , damage.....	30
<i>Parlatoria chinensis</i> —	
description.....	30-32
hosts.....	11
<i>Parlatoria mangiferæ</i> —	
description.....	28-29
attacking mango.....	11
<i>Parlatoria pergandei</i> , damage.....	30
<i>Parlatoria pyri</i> —	
description.....	29-30
infests cuttings of apple and pear.....	11
resemblance to <i>Parlatoria chinensis</i>	31-32
<i>Pasana cuspidata</i> , host of <i>Asterolecanium pasaniæ</i>	62
Pear (see also <i>Pyrus communis</i>)—	
cuttings infested by <i>Parlatoria pyri</i>	11
host of <i>Aspidiotus africanus</i>	51
host of <i>Aspidiotus pectinatus</i>	70
host of <i>Lecanium glandi</i>	46
host of <i>Parlatoria pyri</i>	30
Pepper. (See <i>Schinus molle</i> .)	
<i>Persea gratissima</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Persea</i> sp.—	
host of <i>Lepidosaphes longula</i>	57
host of <i>Pinnaspis rombica</i>	49
<i>Pheidole megacephala</i> , association with <i>Ripersia anomala</i>	65
<i>Pheidole pallidula</i> , nests infested by <i>Phenacoccus formicarum</i>	39
<i>Phillyrea media</i> , host of <i>Lepidosaphes destefanii</i>	57
<i>Phleum pratense</i> , host of <i>Pseudococcus elongatus</i>	40
<i>Phæbe barbusano</i> , host of <i>Chrysomphalus barbusano</i>	55
<i>Phænix canariensis</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Phænix</i> sp., host of <i>Fiorinia fioriniæ</i>	80
<i>Phormium tenax</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Phragmites communis</i> , host of <i>Aclerda biwakoensis</i>	47
<i>Phragmites gigantea</i> , host of <i>Antonina phragmitis</i>	43
<i>Phyllodien</i> , host of <i>Crypthemichionaspis nigra</i>	91
<i>Phytelephas macrocarpa</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Picconia excelsa</i> , host of <i>Aspidiotus lauretorum</i>	93
Pickle weed. (See <i>Salicornia ambigua</i> .)	
Pineapple, host of <i>Pseudococcus ananassæ</i>	64
<i>Pinus densiflora</i> , host of <i>Aspidiotus corticis-pini</i>	52
<i>Pinus kasya</i> , host of <i>Leucaspis indiæ-orientalis</i>	91
<i>Pinus pentaphylla</i> , host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Pinus</i> sp., host of <i>Leucaspis indiæ-orientalis</i>	69
<i>Pinus sylvestris</i> —	
host of <i>Aonidia pinicola</i>	56
host of <i>Leucaspis affinis</i>	50
<i>Pinus thunbergi</i> , host of <i>Fiorinia fioriniæ japonica</i>	82

	Page.
<i>Piper nigrum</i> —	
host of <i>Lepidosaphes piperis</i>	57
host of <i>Protopulvinaria longivalvata</i>	66
<i>Piper</i> sp., host of <i>Fiorinia diaspiiformis</i>	51
<i>Pistacia lentiscus</i> , host of <i>Leucaspis pistaciæ</i>	50
<i>Platonia laurentii</i> , host of <i>Hemilecanium recurvatum</i>	67
<i>Plocama pendula</i> , host of <i>Chionaspis canariensis</i>	89
<i>Pluchea sericea</i> , host of <i>Pulvinaria pluchææ</i>	44
<i>Poa pratensis</i> , host of <i>Pseudococcus elongatus</i>	40
<i>Podocarpus chinensis</i> , host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Podocarpus elata</i> , host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Podocarpus gnidioides</i> , host of <i>Aonidia longa</i>	92
<i>Podocarpus</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Podocarpus nageia</i> , host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Ponera contracta</i> , <i>Ripersia donisthorpei</i> in nests	42
Poplar (see also <i>Populus tremula</i>)—	
host of <i>Fiorinia africana</i>	91
<i>Populus</i> , host of <i>Aspidiotus (Diaspidiotus) transcaspensis</i>	21
<i>Populus</i> sp.—	
host of <i>Aspidiotus popularum</i>	53
host of <i>Aspidiotus transcaspensis</i>	53
<i>Populus tremula</i> , host of <i>Chionaspis micropori</i>	26, 48
Privet, host of <i>Aspidiotus (Diaspidiotus) africanus</i>	17, 19, 51
<i>Prosopis adesmioides</i> , host of <i>Opisthoscelis (?) prosopidis</i>	84
<i>Prospaltella aurantii</i> , parasite of <i>Fiorinia fioriniæ</i>	80
<i>Prunus mume</i> , host of <i>Lecanium kunoensis</i>	46
<i>Psidium guava</i> , host of <i>Ceroplastes singularis</i>	66
<i>Pyrus communis</i> , host of <i>Pseudococcus bakeri</i>	64
<i>Pyrus malus</i> , host of <i>Pseudococcus bakeri</i>	64
<i>Pyrus sinensis</i> , host of <i>Lecanium kunoensis</i>	46
<i>Quercus agrifolia</i> , host of <i>Pseudococcus agrifoliæ</i>	40
<i>Quercus chrysolepis</i> —	
host of <i>Kermes rattani</i>	36
host of <i>Kermes shastensis</i>	85
<i>Quercus densiflora</i> , host of <i>Aspidiotus densiflora</i>	52
<i>Quercus engelmanni</i> , host of <i>Ceroputo koebelei</i>	85
<i>Quercus glandulifera</i> , host of <i>Kermes vastus</i>	37
<i>Quercus incana</i> , host of <i>Kermes himalayensis</i>	36
<i>Quercus lobata</i> , host of <i>Aspidiotus yulupæ</i>	53
<i>Quercus serrata</i> , host of <i>Kermes miyasakii</i>	36
<i>Quercus</i> sp.—	
host of <i>Asterolecanium variolosum minor</i>	63
host of <i>Chionaspis kinshinensis</i>	68
host of <i>Eriococcus howardi</i>	37
host of <i>Kermes variegatus corticalis</i>	37
<i>Quercus suber</i> —	
host of <i>Targionia vitis suberi</i>	55
host of <i>Kermes bacciformis</i>	36
<i>Quercus toumeyii</i> , host of <i>Eriococcus quercus gilensis</i>	37
Quince, host of <i>Aspidiotus (Diaspidiotus) africanus</i>	17, 18, 51
<i>Ramona stachyoides</i> , host of <i>Phenacoccus ramonæ</i>	39
<i>Raphis flabelliformis</i> , host of <i>Fiorinia macroprocta</i>	51
<i>Rhamnus japonica</i> , host of <i>Lecanium kunoensis</i>	46
<i>Rhododendron ferrugineum</i> , host of <i>Eriococcus bezzii</i>	37

	Page.
<i>Rhus lancea</i> , host of <i>Chionaspis mytilaspiformis</i>	90
<i>Rhus</i> sp., host of <i>Aspidiotus (Diaspidiotus) africanus</i>	17, 51
Rice. (See <i>Oryza</i> .)	
<i>Rinorea exappendiculata</i> , host of <i>Pseudaonidia silvatica</i>	54
<i>Robinia pseudacacia</i> —	
host of <i>Aspidiotus (Diaspidiotus) africanus</i>	16, 17, 51
host of <i>Heliococcus bohemicus</i>	87
<i>Rosa arvensis</i> , host of <i>Lecanium pulchrum</i>	46
<i>Rubus</i> sp.—	
host of <i>Lecanium pulchrum</i>	46
host of <i>Phenacoccus colemani</i>	39
<i>Ruta oreojasma</i> , host of <i>Chionaspis canariensis</i>	89
Sage, black. (See <i>Ramona stachyoides</i> .)	
<i>Salicornia ambigua</i> , host of <i>Ceropto ambigua</i>	64
<i>Salsola longifolia</i> , host of <i>Chionaspis canariensis</i>	89
<i>Sambucus glauca</i> —	
host of <i>Pseudococcus bakeri</i>	64
host of <i>Pseudococcus obscurus</i>	41
SANDERS, J. G., paper, "Catalogue of Recently Described Coccidæ—II".....	33-60
Sapindacæ, host of <i>Fiorinia hirsuta</i>	51
<i>Sapium sebiferum</i> , host of <i>Ceronema kœbeli</i>	66
<i>Sarothamnus scoparius</i> , host of <i>Lecanium pulchrum</i>	46
SASSCER, E. R.—	
papers, "Catalogue of Recently Described Coccidæ—III, IV" ..	61-74, 83-97
paper, "Index to Catalogues of Recently Described Coccidæ Included in Technical Series Nos. 12 and 16".....	99-116
paper, "The Genus <i>Fiorinia</i> in the United States".....	75-82
<i>Saxegothæa conspicua</i> , host of <i>Pseudoparlatoria chilina</i>	56
Scale insects, new species of diaspine.....	11-32
<i>Schinus molle</i> , host of <i>Aspidiotus (Diaspidiotus) africanus</i>	16, 17, 18, 51
<i>Schotia humboldtioides</i> , host of <i>Aonidia biafræ</i>	70
"Shirotsugi," host of <i>Saissetia pseudonigrum</i>	67
<i>Sida cordifolia</i> , host of <i>Phenacoccus insolitus</i>	39
<i>Sideroxylon ferrugineum</i> , host of <i>Saissetia sideroxylum</i>	67
<i>Sideroxylon inerme</i> , host of <i>Aspidiotus fissidens pluridentatus</i>	93
<i>Sima spininoda</i> , association with <i>Stictococcus formicarius</i>	64
<i>Sleichera trijuga</i> , host of <i>Tachardia albizziæ</i>	87
<i>Smilax canariensis</i> , host of <i>Aspidiotus lauretorum</i>	93
<i>Solanum melongena</i> , host of <i>Chionaspis manni</i>	48
<i>Solanum</i> sp., host of <i>Inglisia castilloæ</i>	88
<i>Solenopsis</i> sp., association with <i>Ripersia sardinia</i>	42
<i>Sphærostilbe coccophila</i> , enemy of <i>Fiorinia fioriniæ</i>	80
<i>Stachys glutinosa</i> , host of <i>Aspidiotus labiatarum</i>	52
<i>Streitzia reginiæ</i> , host of <i>Fiorinia fioriniæ</i>	80
<i>Strombosiopsis tetrandæ</i> , host of <i>Aspidiotus spiniger</i>	70
<i>Strychnos cinnabarina</i> —	
host of <i>Aspidiotus fissidens</i>	69
host of <i>Aspidiotus undulatus</i>	70
host of <i>Diaspis stilosa</i>	69
host of <i>Ischnaspis bipindensis</i>	71
Sugar cane—	
host of <i>Pseudococcus boninsis</i>	64
host of <i>Pseudococcus saccharifolii</i>	41

	Page.
"Sunt" tree. (See <i>Acacia arabica</i> var. <i>nilotica</i> .)	
"Suriya." (See <i>Thespesia populnea</i> .)	
<i>Symplocos obtusa</i> , host of <i>Cerococcus albospicatus</i>	63
<i>Syzygium guineense</i> , host of <i>Diaspis africana</i>	68
Tamarind, host of <i>Monophlebus tamarindus</i>	33
<i>Tamarix</i> sp., host of <i>Chionaspis trusca</i>	48
<i>Tapinoma erraticum</i> , association with <i>Micrococcus silvestrii</i>	42
<i>Taxus baccata</i> , host of <i>Chrysomphalus taxus</i>	55
<i>Taxus wallichiana</i> , host of <i>Fiorinia odinae multipora</i>	91
Tea—	
host of <i>Chionaspis manni</i>	48
host of <i>Fiorinia theæ</i>	77, 78
host of <i>Inglisia castilloæ</i>	88
host of <i>Pseudococcus theæcola</i>	41
host of <i>Tachardia decorella theæ</i>	43
Tea scale. (See <i>Fiorinia theæ</i> .)	
Tea. (See <i>Thea japonica</i> .)	
<i>Terminalia catappa</i> , host of <i>Pseudococcus crotonis</i>	86
<i>Tetramorium cæspitum</i> , association with <i>Lecanopsis mirmecophila</i>	47
<i>Teucrium capitatum</i> , host of <i>Aspidiotus labiatarum</i>	52
<i>Thea japonica</i> —	
host of <i>Fiorinia fioriniæ</i>	80
host of <i>Lichtensia japonica</i>	68
<i>Theobroma cacao</i> —	
host of <i>Ceroplastes virescens</i>	66
host of <i>Ceroplastodes theobromæ</i>	45
host of <i>Hemilecanium theobromæ</i>	47
host of <i>Tachardia albizziæ</i>	87
<i>Thespesia populnea</i> —	
host of <i>Asterolecanium thespesiæ</i>	63
host of <i>Pulvinaria thespesiæ</i>	66
<i>Thuja</i> , host of <i>Parlatoria chinensis</i>	11
<i>Thuja orientalis</i> , host of <i>Parlatoria chinensis</i>	31, 58
<i>Thymelæa tarton</i> (?), host of <i>Aspidiotus privignus</i>	53
Tobacco, host of <i>Coccus nicotianæ</i>	45
Trailing arbutus. (See <i>Epigæa repens</i> .)	
<i>Trema guineensis</i> , host of <i>Lecanium tremæ</i>	89
<i>Tricalysia</i> sp., host of <i>Pseudoonidia gracilis</i>	54
<i>Tricycla cacheuta</i> , host of <i>Cerococcus andinus</i>	84
<i>Tricycla patagonica</i> , host of <i>Cerococcus andinus</i>	84
<i>Trifolium panormitanum</i> , host of <i>Pseudococcus aridorum</i>	86
<i>Triticum vulgare</i> , host of <i>Phenacoccus cholodkovskyi</i>	38
<i>Trulliflorinia</i> , characters of subgenus.....	75
<i>Tsuga sieboldi</i> , host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Tsuga</i> sp.—	
host of <i>Aspidiotus tsugæ</i>	94
host of <i>Fiorinia fioriniæ japonica</i>	82
<i>Turræa</i> sp., host of <i>Hemichionaspis chionaspiformis</i>	91
<i>Uhleria fioriniæ</i> , synonym of <i>Fiorinia fioriniæ</i>	79
<i>Ulex europæus</i> , host of <i>Lecanium pulchrum</i>	46
<i>Ulmus</i> , host of <i>Lepidosaphes ficifoliæ ulmicola</i>	57
<i>Urera sandwichensis</i> , host of <i>Cissococcus</i> ? <i>oahuensis</i>	85
<i>Uvaria</i> sp., host of <i>Ceroplastes uvariæ</i>	45
<i>Vendtia calycino</i> , host of <i>Cerococcus badius</i>	84

	Page.
<i>Vernonia</i> sp., host of <i>Inglisia castilloæ</i>	88
<i>Viburnum odoratissimum</i> , host of <i>Solenococcus muratæ</i>	36
Walnut. (See <i>Juglans regia</i> .)	
<i>Walsura piscidis</i> , host of <i>Aonidia dentata</i>	70
Wild rye. (See <i>Elymus condensatus</i> .)	
<i>Xanthophyllum flavescens</i> , host of <i>Cryptoparlatores parlatores</i>	95
<i>Xanthoxylon</i> , host of <i>Parlatoria chinensis</i>	11, 31, 58
<i>Zilla macroptera</i> , host of <i>Aspidiotus seurati</i>	70
<i>Zizyphus</i> sp., host of <i>Parlatoria chinensis</i>	11
<i>Zizyphus spinachristi</i> , host of <i>Pseudococcus perniciosus</i>	65
<i>Zuccagnia punctata</i> —	
host of <i>Eriococcus diversispinus</i>	85
host of <i>Saissetia silvestrii</i>	89



TECHNICAL SERIES, No. 16, PART I.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

THE NATIONAL
COLLECTION OF COCCIDÆ.

By C. L. MARLATT, M. S.,
Entomologist and Assistant Chief of Bureau.

ISSUED APRIL 23, 1908.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1908.

CONTENTS.

	Page.
Historical summary	1
Recent work of the Bureau	4
Preservation of material	5
The slide collection.....	5
Recent additions and present status.....	6
Methods of study	7
The work of the future	9
A plea for the deposit of types	10

PAPERS ON COCCIDÆ OR SCALE INSECTS.

THE NATIONAL COLLECTION OF COCCIDÆ.

BY C. L. MARLATT, M. S.,

Entomologist and Assistant Chief of Bureau.

The collection of scale insects or Coccidæ, accumulated chiefly through the agency of the Bureau of Entomology of the U. S. Department of Agriculture and forming a part of the national collection of insects, is undoubtedly the most valuable and complete in existence. This has come from the early interest of the Bureau in the subject through the work of Prof. J. H. Comstock, and as a result of the generosity of many of the describers of new species of later years in depositing types or cotypes in the National Collection. It may not be out of place, therefore, to give a brief historical summary of the National Collection of Coccidæ, together with a description of its present condition, an account of the methods of installation and preservation of material, and a numerical statement of species and types represented.

HISTORICAL SUMMARY.

The knowledge in America of this important group of insects was very scant prior to 1880. During that year Prof. J. Henry Comstock, then Entomologist of the Department of Agriculture, in the course of an investigation of the insects injurious to orange trees, begun the previous year, noted that the greater part of the insect injury to citrus fruits was due to scale insects. This led him to make, during 1880, a particular study of the family Coccidæ, broadening the inquiry to include the study of all scale insects affecting cultivated plants in the United States. Professor Comstock personally collected many southern species in a trip through Florida in January and February, 1880, and during the following summer spent three months in the fruit-growing sections of California and Utah investigating the subject and

collecting scale insects. He was assisted also by several of his colleagues in the office, notably Dr. L. O. Howard and Mr. Theo. Pergande. The results of this work appeared as Part II of his Annual Report for 1880, in a paper on scale insects, which included descriptions of most of the Coccidæ then in the collection of the U. S. Department of Agriculture, lack of space preventing the description of all the species which had been collected up to that time. Some 45 species are listed and described in this report, more than half of which were new to science. Previous to this only about 30 species had been described by American writers, the majority of which are to be credited to Dr. Asa Fitch. Most of the species referred to in Comstock's report were figured, and these figures mark the beginning of really careful scientific drawings of Coccidæ, and have since been standard illustrations of the species concerned.

Doctor Howard, while assisting Professor Comstock in the study of Coccidæ, took up particularly the subject of the chalcidid parasites of these insects, and presented as Part III of Professor Comstock's report a paper entitled "Report on the Parasites of the Coccidæ in the Collection of this Department." This was the beginning of Doctor Howard's work on chalcidid parasites and led to his becoming the world's authority on the subject. How little was known of these parasites previous to the publication of this paper is shown by the fact that, with four or five exceptions, the species described and figured were new to science.

Professor Comstock retired from the position of Entomologist in 1881, but published in Professor Riley's Report for that year a short illustrated article on Lac Insects, describing three new species. He also gave a brief article on methods of controlling scale insects. A much more important article on remedies for scale insects of the orange, by Mr. H. G. Hubbard, is published in the same report. In this paper some very good work is recorded and some of the more important modern methods of control are given first exploitation.

Professor Comstock's report on Coccidæ in the Department Report of 1880, as already indicated, was incomplete and did not include all of the species collected. His final paper occupied the principal portion of the Second Report of the Department of Entomology of the Cornell University Experiment Station, published in 1883. This paper is a brief monograph of the subfamily Diaspinæ as represented in the fauna of North America, together with notes on species not at that time observed in the United States. Several new species are described in this report, and the latter concludes with a list of the American nondiaspine scale insects.

This practically concluded Professor Comstock's work on Coccidæ, and for a long period thereafter the systematic study of this important group of insects practically ceased in this country. The

Department Collection contained types or cotypes representing practically all of Comstock's work, and examples of the known species collected by him, and Mr. Theo. Pergande undertook, during the years following 1880, to identify the material which was sent to the Department by comparison with named material in the collection. Mr. Pergande's work during this period was of great value to the Bureau and to the entomologists in this country, but necessarily much that came in could not be identified, and there was a large accumulation of unnamed material representing in part old species and in part species new to science.

Mr. H. G. Hubbard, who has already been referred to as having published an important paper on remedies for Coccidæ in the Annual Report of the Department for 1881, continued his investigation of orange insects and the means of controlling them, at Crescent City, Fla., as an agent of the Department of Agriculture, and published in 1885 his excellent report entitled "Insects Affecting the Orange." This represented nearly four years' study and experiment, and dealt very largely with the common scale enemies of the orange. Mr. Hubbard's interest in scale insects, aroused in this study, continued, although he published nothing noteworthy afterwards on the subject. It was, however, his intention to bring out a new and thoroughly revised edition of his Orange Insects, and to take up in connection with it a study of the classification of Coccidæ; but his untimely death prevented the accomplishment of this task.

About 1891 Prof. T. D. A. Cockerell began to collect and study the Coccidæ of Jamaica, where he was then stationed. For some years much of his material came to this office for determination, but in a short time he became familiar with the subject, and ultimately the world's best authority in the group, and for a period of several years much of the new material coming to the Department was sent to him for determination and description. Professor Cockerell had in the meantime accepted a position in the New Mexico Agricultural College, and his collections and descriptions of Coccidæ were enriched by the inclusion of many new southwestern species as well as by material which came to him from all quarters of the world. Very fortunately his close cooperation and sympathy with the Bureau of Entomology and interest in the National Collection led him to deposit his types in Washington, thus very greatly enriching the local collection. Professor Cockerell, while diminishing very much his activity in this group in later years, has retained his interest. During his most active decade his publications on Coccidæ were voluminous, much exceeding the work of any other investigators in this field with the possible exception of Signoret and Maskell. In connection with this Bureau he published several papers, notably his bulletin on the

San Jose scale and its nearest allies,^a and, through the Smithsonian Institution, papers on the food plants of scale insects,^b directions for collecting and preserving scale insects,^c and geographical distribution of scale insects.^d

RECENT WORK OF THE BUREAU.

The resumption of active study of Coccidæ in connection with the Department of Agriculture began in the early nineties, partly as a result of the interest aroused by the San Jose scale and the necessity of being able to determine at once and authoritatively all material which was coming in supposedly representing this new and dangerous species. It proved, in other words, impracticable to be dependent for such determinations on specialists at a distance. Mr. Pergande, who had had charge of the coccid collections, had his time so fully taken up with other lines of investigation, notably the subjects of Aphididæ and Formicidæ, that he could not keep up with the rapidly increasing collection and literature in Coccidæ. To meet the need and following the incentive of an old interest the writer therefore took as his special field in systematic entomology the subject of Coccidæ. A season spent in studying orange insects in southern California accentuated his interest in the subject, and general charge of the Department collections in this family was assumed by him in 1900, and a thorough reorganization of the collection and notes was then begun. Before this work had progressed very far it was interrupted for more than a year by a trip to the Orient, in which, however, the scale insects were the special object of study and collection.

During the twenty years which had elapsed since the work of Comstock, a great mass of material had accumulated, most of it preserved under very bad conditions, and more than half of it unidentified. It was no small undertaking to bring all this mass into order, and in this work the writer was assisted during a number of years by Messrs. J. Kotinsky and E. R. Sasser.

The enormous increase in the number of scale insects, and the amount of technical work necessary to determine the validity of species and to identify new material, made it early evident that it would be impossible for the writer to keep the whole subject as his own field, and in January, 1905, Mr. J. G. Sanders was appointed an assistant in the Bureau and became the writer's colleague in the study of Coccidæ, the important field of the nondiaspine scale insects, together with the collections and notes, being turned over to him unreservedly. Mr. Sanders is also charged with the very important

^a Tech. Ser. 6, Div. Ent., U. S. Dept. Agric., 1897.

^b Proc. U. S. Nat. Mus., XIX, No 1122, pp. 725-785, 1897.

^c Bul. 39, Part L, U. S. Nat. Mus., 1897.

^d Proc. U. S. Nat. Mus., XVII, No. 1026, pp. 615-625, 1895.

inspection and quarantine work of the new importations made by the Department, and in this field has detected and prevented the introduction of a number of new scale insects which probably would have made very destructive records if established in this country.

PRESERVATION OF MATERIAL.

The first effort was to arrange for the proper preservation of the type and other material, and a modification of the system followed by Green was adopted—namely, the inclosing of material in strongly made pasteboard boxes, following a definite unit of length and breadth, 3 by 2 inches, so that they can be arranged in five columns in the standard insect drawer which has been in use in the U. S. National Museum; ^a these boxes vary in depth, however, to accommodate different quantities of material. All type and valuable material, in fact all material not in large quantity, is further protected by being first folded in squares of lens paper to retain any loose scales or insects. By this system the bulk of the collection was enormously reduced and loss of valuable specimens obviated. This system presents also the great convenience that additions may be made with the same facility as in a card catalogue.

Special card labels suitable to the nature of the collection were secured from the Library Bureau. These are of different colors to indicate respectively the genus, the valid species and varieties, and the typical material of the species reduced to synonymy.

THE SLIDE COLLECTION.

The slide preparations of the different species had become very extensive, and now comprise fully 10,000 slides, relating to more than a thousand species. A new system of storage for slide material was devised, following the plan of the ordinary card catalogue cabinet. ^b The older systems of slide storage had proved to be very unsatisfactory for so large a collection representing so many different species. None of the older systems was sufficiently elastic or allowed easy systematic classification, but required card indexes and the consultation of many different slide boxes to get together material representing a single subject. This led the writer to devise a cabinet in which the slides could be filed on the card index plan. To enable a slide to be thus stored a special envelope or jacket is provided for each slide. This jacket is made of strong manila paper and but little larger than the standard slide size (slide 1 by 3 inches, jacket 1½ by 3¼ inches), affords an opportunity for sufficient labeling, and

^a The insect drawers since then adopted by the National Museum, and intended for pinned insects, are somewhat shallower than those first used.

^b See Science, Dec. 30, 1904, p. 925.

can be filed exactly as an index card. The cabinet follows the general plan of a library card index, is of five drawers of three partitions each, and holds upward of 2,000 slides. Guide cards were devised to correspond with the slide envelope, and have on their lower edge an extended lip perforated for the countersunk retaining rod which runs just below the level of the slides. This rod holds the guide cards and gives additional security to the slides, which remain steadily in place by their own weight. Each cabinet is arranged with a lock which fastens all five drawers. The latter have the retaining device so that there is no danger of pulling them entirely out and spilling their contents. The envelopes, however, give such protection to the slides that the latter will not break even from falling some distance, and, furthermore, they protect the slides entirely from dust. The slide cabinets, envelopes, and guide cards are all made by the Library Bureau at very reasonable cost. The slide jackets cost about \$2 a thousand, and the cabinets are but little more expensive than the ordinary index case.

This system of storing slides allows for additions indefinitely in exact classification, with as minute and accurate subdivisions as may be necessary. It has now been in use some five years and has given complete satisfaction. The work of consulting the slides and handling the material is reduced at least two-thirds, and consultation is so easy that it increases the usefulness of the slide collection many times.

The cabinet described here in some detail is suitable for dry balsam mounts, and in the preparation of slides of Coccidæ the mount, as soon as prepared, is dried over an alcohol flame for a few seconds, when it can be put at once into the jacket. In any case where the slide can not be thus dried it must be laid in a horizontal position until the balsam has become thoroughly hardened. Once thoroughly dried, the intense heat of Washington summers does not result in any softening or attachment of the slide to the inclosing jacket.

A card catalogue has been made of all the material which has come to the Department, and the accumulated notes have been systematically arranged so that they are available for instant reference. This work has been done whenever time was available, and has often been interrupted for weeks or months together, but has now resulted in the collection, notes, and records being in exceptional order and in shape for study by the specialist with the greatest economy of time.

RECENT ADDITIONS AND PRESENT STATUS.

The deposit of the types of Professor Cockerell's new species represent the most important additions since Comstock's time. Following this commendable example, most of the other workers in this group

in this country have given their types, or at least cotypes, to the National Collection. Among this material are the species described by Newell, King, Sanders, Tinsley, Johnson, Townsend, Cooley, Coleman, and Woglum. Cotypes of the greater number of Green's oriental species have also been most kindly presented by him to the National Collection, making a large and very valuable addition. Cotypical or authentic material representing many of the new species of other foreign workers in the family has been received in exchange or by gift, including a considerable percentage of Maskell's species and those of later students, notably Hempel.

The collection now includes, besides much unidentified material, representatives of 1,072 species of Coccidæ, of which 816 are types or cotypes. Of these 366 belong to the subfamily Diaspinæ, with 293 types; and 706 to the non-diaspine scales, with 523 types. The described Coccidæ of the world now reach a total of nearly 1,600, but of these, from the critical studies which have been in progress now for several years, it seems likely that at least one-third will fall as synonyms, leaving perhaps a thousand valid species. A corresponding proportion of the type and other material in the National Collection of Coccidæ will fall as synonyms. Nevertheless, the figures given indicate a collection of extraordinary richness and value in its accumulation of species and types. In working out synonymy the type specimens of the synonyms, together with the material referred to these synonyms by the describers or later workers of authority, are kept together, so that they can be easily referred to should any question arise as to their status.

METHODS OF STUDY.

A very large amount of laborious preliminary work has been done which makes no showing, but in the course of this work those who are actively conducting it have gained such a familiarity with the subject and so broad an acquaintance with the different genera that it should now be possible for them to monograph the material far more satisfactorily and accurately than ever before. The opportunity now had for comparison of types leads necessarily to the discovery of a large amount of synonymy, and the task of weighing and definitely ascertaining the status of older work is now in progress and represents the most difficult part of the undertaking, although a necessary preliminary to the description of new species and the monographing of genera.

In attempting to make determinations from published descriptions the inadequacy of the characterizations was at once felt, through no fault, however, of the early describers, who followed the customary methods of the time, just as the descriptions of this day may similarly

prove to be inadequate fifty years from now. The principal difficulty, however, was that many structural features of the insect were not mentioned in the descriptions, and hence a systematic arrangement from descriptions was impossible, or, if attempted, very faulty. To give a standard for comparisons of descriptions, the writer has drawn up a scheme to be followed which has proved to be a great convenience. It at least insures that no important character is omitted, and the discussion of the different parts in regular order allows an easy comparison of the same characters for different species. Card blanks have been prepared, and following the printed indications the descriptions can be made very readily in abbreviated form and elaborated as fully as necessary for publication. These cards, being of the same size (5 by 8 inches) as the standard note card adopted by the Bureau, are filed as a permanent record. The card illustrated below is designed especially for the diaspine scale insects. Some modification of this card is necessary for the non-diaspine species, and Mr. Sanders has worked out such a modification, also illustrated. It is hoped that the describers of new species of scale insects will follow the order indicated on these cards, so that all future descriptions may be readily compared.

Order followed in describing Diaspinæ.

Name :

FEMALE SCALE: (Size, shape, density, convexity, color, pellicles, ventral scale, situation, etc.).

MALE SCALE: (Do.) Male insect: (Unimportant).

ADULT FEMALE: (Shape, size, color, chitinization, anterior and marginal characters, stigmatic pores—if present, relationship).

ANAL PLATE: (Shape, size, color, chitinization, etc.).

LOBE: (No., size, shape, chitinization, position, etc.).

LATERAL TEETH: (Anterior to lobes and plates).

INCISIONS: (i. e., notches between lobes).

PARAPHYSES: (Chitinous thickenings at base of lobes and sometimes marginal beyond lobes).

PLATES: (No., character, situation).

SPINES: (Position same for all species, as a rule unimportant).

ANAL OPENING: (Size, shape, position). GENITAL OPENING: (Unimportant).

PARAGENITALS: (No., massed or scattering, etc.).

DORSAL PORES: (No., size, distribution, etc.).

BASAL THICKENINGS: (Transverse, broken, rod-like elevations near base of plate—dorsal).

VENTRAL THICKENINGS: (Broad areas of slight chitinization extending from tip and longitudinal ridges laterad of vaginal opening).

TYPE: (Dept. No., U. S. Nat. Mus. No., host, locality, coll., date).

NOTE: (Prominent distinguishing characters, relationships, etc.).

Order followed in describing non-diaspine Coccidæ.

Name:

MALE: (Scale or puparium; adult, emergence).

FEMALE: (Size, shape, color, markings, secretion, maturity, reproduction).

DERM (CLEARED): (Character, size, outline, color, chitinization, pilosity, color in KOH).

ANTENNÆ: (Location, segments, measurements in μ , formula, hairs).

LEGS: (Location, development, pilosity, coxa, trochanter, femur, tibia, tarsus, claw, digitules).

SPIRACLES: (Location, character, pores).

PORES: (Character, simple or compound; arrangement, dorsal, ventral).

SPINES—MARGINAL: (Character, length, arrangement). SPIRACULAR: (Character, length, arrangement).

HYPOPYGIAL: (Character, number, arrangement). SURFACE: (Character, length, arrangement).

ANAL PLATES: (Shape, size, character, location).

SETÆ—FRINGE: (Number, location, length). SUBAPICAL: (Number, location, length).

APICAL: (Number, location, length).

THICKENINGS: (Character, location).

ANAL RING: (Shape, character, number of hairs).

TYPE: (Host, locality, date, collector).

NOTE: (Prominent distinguishing characters, peculiarities, relationships, etc.).

THE WORK OF THE FUTURE.

It is the intention of the writer and of his colleagues in the study of this family to work out the synonymy of described material which has accumulated, to prepare synoptic tables of the different genera, and describe the species which seem to be new to science. These papers will be issued from time to time as parts of the present bulletin and of later bulletins of the Technical Series of this Bureau.

The catalogue and bibliography of Coccidæ, started in such a comprehensive and thoroughgoing manner by Mrs. Fernald, will be continued in biennial supplements by Mr. J. G. Sanders, one such supplement having already been issued.^a

One of the great difficulties in the study of Coccidæ has been the inaccessibility of the types of Maskell's many new species, especially as the descriptions and figures were in most cases inadequate. It is a pleasure, therefore, to be able to announce that, through the courtesy of Mr. T. W. Kirk, the Department is to be allowed to make a critical examination and study of all of Maskell's types and other material, which are now making their long journey from Wellington, New Zealand, to Washington for this purpose.

The field of Coccidæ is a very large one, and there is plenty of room in it for a considerable number of students, and the National Collec-

^a Tech. Ser. No. 12, Part I, Bur. Ent., U. S. Dept. Agriculture. 1906.

tion is open to anyone who wishes to study or consult it. A good deal of exchange material of value has been accumulated, and exchanges for species not represented in the Department Collection will be gladly made.

A PLEA FOR THE DEPOSIT OF TYPES.

The Coccidæ present special difficulties in the way of determination on account of their small size and the necessity of making careful microscopic preparations. Furthermore, it is not very practicable to determine material from descriptions only, and it is necessary in most cases to have type, or accurately identified material, for the purpose of comparison. With Coccidæ, therefore, more than with other groups of insects, it seems necessary to have some central depot for the deposit of types, where authoritative identifications may be made. It is hoped and urged, therefore, that all American describers of new species will adopt the course of placing type or cotype material in the National Collection, where it will be carefully preserved and be available for study at any time.



TECHNICAL SERIES, No. 16, PART II.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

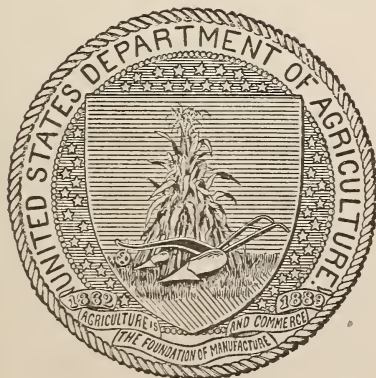
L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

NEW SPECIES OF
DIASPINE SCALE INSECTS.

By C. L. MARLATT, M. S.,
Entomologist and Assistant Chief of Bureau.

ISSUED AUGUST 5, 1908.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1908.

CONTENTS.

	Page.
Introductory.....	11
Aspidiotus (s. str.) comperei.....	12
Aspidiotus (s. str.) meyeri.....	13
Aspidiotus (Aonidiella) cocotiphagus.....	14
Aspidiotus (Diaspidiotus) africanus.....	15
Aspidiotus (Diaspidiotus) coursetiæ.....	20
Aspidiotus (Diaspidiotus) transcasiensis.....	21
Aspidiotus (Hemiberlesia) epigææ.....	21
Aspidiotus (Hemiberlesia) mitchelli.....	22
Aspidiotus (Hemiberlesia) popularum.....	23
Aonidia juniperi.....	24
Aspidiotus (Targionia) chenopodii.....	24
Chionaspis micropori.....	25
Leucaspis indica.....	26
Mytilaspis chilopsidis.....	27
Parlatoria mangiferæ.....	28
Parlatoria pyri.....	29
Parlatoria chinensis.....	30

ILLUSTRATIONS.

	Page.
PLATE I. Fig. 1.—Aspidiotus (s. str.) comperei. Fig. 2.—Aspidiotus (s. str.) meyeri.....	12
II. Fig. 1.—Aspidiotus (Aonidiella) cocotiphagus. Fig. 2.—Aspidiotus (Aonidiella) cocotiphagus.....	14
III. Fig. 1.—Aspidiotus (Diaspidiotus) africanus. Fig. 2.—Aspidiotus (Diaspidiotus) coursetiæ.....	14
IV. Fig. 1.—Aspidiotus (Diaspidiotus) transcasiensis. Fig. 2.—Aspidiotus (Hemiberlesia) epigææ.....	22
V. Fig. 1.—Aspidiotus (Hemiberlesia) mitchelli. Fig. 2.—Aspidiotus (Hemiberlesia) popularum.....	22
VI. Fig. 1.—Aonidia juniperi. Fig. 2.—Aspidiotus (Targionia) chenopodii.....	24
VII. Fig. 1.—Chionaspis micropori. Fig. 2.—Leucaspis indica.....	26
VIII. Fig. 1.—Mytilaspis chilopsidis. Fig. 2.—Parlatoria mangiferæ.....	28
IX. Fig. 1.—Parlatoria pyri. Fig. 2.—Parlatoria chinensis.....	30

PAPERS ON COCCIDÆ OR SCALE INSECTS.

NEW SPECIES OF DIASPINE SCALE INSECTS.

By C. L. MARLATT, M. S.,
Entomologist and Assistant Chief of Bureau.

INTRODUCTORY.

The species described below as new to science are mostly insects of potential economic importance, as indicated by place of origin and host plants. The facts concerning each of these species in these particulars are given in the notes accompanying the descriptions.

Of the seventeen species listed, four are apparently native to this continent, and the rest are foreign. Of the latter, five species have been found on living plants recently imported from foreign countries. Two of these, *Leucaspis indica* and *Parlatoria mangiferæ*, attack mango. The former is established in mango plantings in Florida and Porto Rico, and the latter is found more or less generally infesting the mango nursery stock in the Department greenhouses. A vigorous effort is being made to exterminate both of these scale insects. *Parlatoria pyri* infested cuttings of apple and soft pear imported from Manchuria, and might easily become a pest second only to the San Jose scale in importance. All of the infested cuttings were burned, and the entire stock was thoroughly fumigated. *Parlatoria chinensis* infested *Xanthoxylon*, *Thuja*, and *Zizyphus* sp. imported from China, and is closely related to *pyri*. Both of these *Parlatorias* were collected by the writer in China in 1901. *Aspidiotus meyeri* infested an *Abies* imported from the region of Peking, China. The rest of the foreign material came to the Department for determination from various collectors as dry, dead specimens, and the danger of the introduction of these species is a future one. Of the latter, the ones presenting the greatest danger to this country are *Aspidiotus cocotiphagus*, which in Cuba infests the cocoanut and trifoliolate orange, and is doubtless capable of developing a wide range of food plants, and *Aspidiotus africanus*, which is making in South Africa a reputation very similar to that of the San Jose scale in this country.

Credit is due Mr. J. G. Sanders, of this Bureau, who made the photomicrographs of the anal plates of the species described in this paper. While it does not seem possible to get a photograph which will show satisfactorily all the structural characters of the anal plate, these photographs are still very helpful as supplementing the text, and give a general pictorial effect which it is impossible to convey by description.

ASPIDIOTUS (s. str.) COMPEREI n. sp.

(Plate I, fig. 1.)

Scale of female: About 1 mm. in diameter, strongly convex, nearly circular. Exuviæ covered, but covering secretion easily rubbed off, exposing the lemon-yellow to brown exuviæ. Secretion covering the larval exuvia sometimes more dense and adherent, thus sometimes giving the scale an annulated appearance due to the second exuvia showing through the section surrounding the larval skin. Secretionary supplement normally white, sometimes slightly yellowed. Ventral scale inconsiderable.

Scale of male: About one-half the size of the female scale, and of the normal oval shape.

Adult female: In balsam mount, nearly circular and hyaline, with a diameter of about 0.8 mm.; *anal plate* broad, rounded, about 0.2 mm. long by 0.3 mm. broad, for the most part hyaline, apical third very slightly suffused or chitinized; three pairs of very small, narrow, subequal lobes; median lobes rectangular and more heavily chitinized than laterals, and with chitinization, not sharply limited, extending into the pygidium something more than a lobe's length; lateral lobes with distinct outer shoulder and somewhat constricted at base, hyaline; a projection is sometimes seen at some distance anterior to the third lobe having the appearance of a rudimentary fourth lobe; incisions shallow, given a truncate appearance by the occurrence of marginal pores; paraphyses wanting; plates about lobe length, inconspicuous, apparently two median, two in first incision, and three in second incision, with some additional rudimentary plates beyond second lateral incision; spines normal; anal opening oval, very large, larger than the two median lobes together, remote from tip, near center of the segment; paragenitals represented only by the anterior lateral groups, which consist of from 1 to 4 (usually 2) glands; dorsal glands small and rather numerous, limited to the apical third of the margin of the segment; basal thickenings wanting; ventral thickenings not present as a divaricating band from the tip, but represented by the uniform chitinous suffusion of the apical third of the segment.

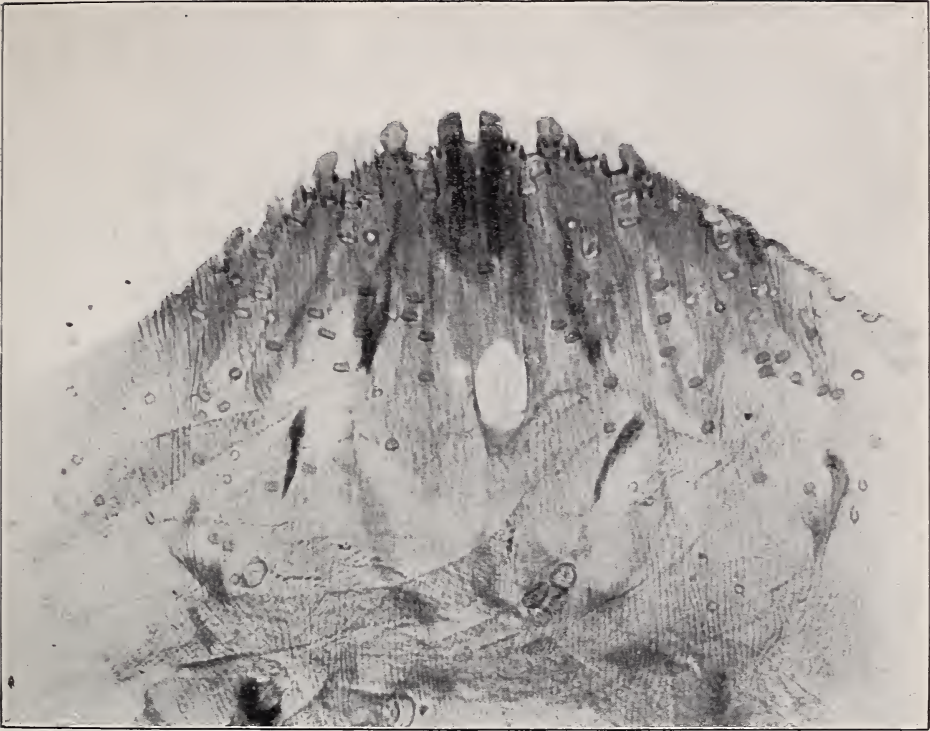


FIG. 1.—ASPIDIOTUS (S. STR.) COMPEREI.

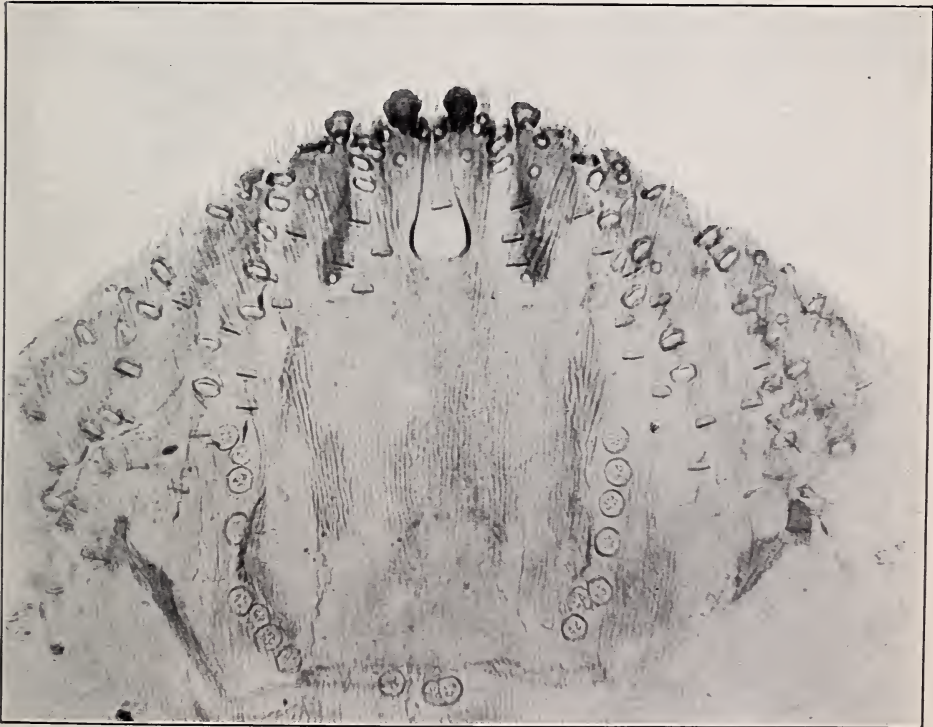


FIG. 2.—ASPIDIOTUS (S. STR.) MEYERI.

ANAL PLATES OF NEW SCALE INSECTS.

Type.—Bureau of Entomology No. 14129. On *Hake* sp. and an undetermined plant. Ravensthorpe, West Australia, collected by George Compere (Nos. 968 and 990), received at the Department February, 1902.

NOTE.—This species in scale characteristics and large anal orifice reminds one of *Aspidiotus camelliæ* Sign.; in its pygidial characters it is more like *A. destructor* Sign. It differs distinctly, however, from both of these species, as indicated in the description. It occurs massed rather thickly on the smaller twigs of the two food plants. It does not seem to coincide with any of the species described by Maskell, although, when Maskell's types are examined, it may fall to one of his species.

ASPIDIOTUS (s. str.) MEYERI n. sp.

(Plate I, fig. 2.)

Scale of female: Elongate oval, 1.5 to 2 mm. (or more) in length; very convex; exuviae subcentral; larval secretion whitish except as obscured by extraneous matter; main or subsequent secretion dull resinous brown; larval secretion and exuvia easily lost, exposing the large, bright orange colored second exuvia; scale adhering very loosely to the leaf and easily dislodged, leaving the insect exposed; inner surface of scale covered with snow-white secretion which entirely conceals the exuviae.

Scale of male: Not certainly identified, but apparently the same general type as female, except as to size and number of exuviae.

Adult female: Long, oval, distinctly robust or convex, 0.7 to 0.9 mm. broad by 1 to 1.4 mm. long; hyaline in balsam mount; *anal plate* broad, rounded, in general hyaline, 0.32 mm. broad by 0.20 mm. long; two pairs of simple normal lobes, median largest and most chitinized, 0.012 mm. in diameter; both lobes with two minute shoulders, often worn, and shoulders obscure; some distance beyond the second lobe is a very low, rudimentary, lobular projection, with difficulty distinguished, terminating in a nipple or pointed tip; lateral teeth wanting; incisions moderate, normal; paraphyses practically wanting; plates lower than lobes, broad, many-branched; 2, 2, 3, and, following the rudimentary lateral lobe, 4 or 5 narrow, branched plates; spines very short and inconspicuous; anal opening large, circular, 0.2 mm. in diameter, larger than a single median lobe and about two lobes distant from base of lobes; paragenitals in five groups, 2-4, 3-3, 3-4; dorsal pores large and conspicuous, in rows counting from the center as follows: 3-4, 5-7, 6-7, with a few additional pores in obscure rows of 2, 3, or 4 pores each; basal thickenings represented by two narrow median transverse rods, and the

widely separated oblique lateral thickenings; ventral thickenings normal, but slightly chitinized.

Type.—Bureau of Entomology No. 14137. On *Abies* sp., imported by F. N. Meyer, for the Bureau of Plant Industry, from Wu Tai Shan, near Peking, China, received April 21, 1908.

NOTE.—This insect occurs quite abundantly on the short leaves of the *Abies*. It is closely allied to *abietis* Schrank, but diverges from the latter in some easily recognizable structural features. The margin of the anal segment beyond the second incision presents but one lobular projection instead of two, as is the case with *abietis*; and, furthermore, in *abietis* these projections are more produced and are finely serrate on the oblique outer margin.

ASPIDIOTUS (AONIDIELLA) COCOTIPHAGUS n. sp.

(Plate II, figs. 1, 2.)

Scale of female: Subcircular, 1.6 to 2 mm. in diameter; light yellowish brown, with a very minute central white tubercle; exuviae central, larval 0.35 mm. in diameter; second stage, 0.75 mm. in diameter.

Scale of male: Similar in color to the female, oval, a little over a millimeter long by 0.7 mm. wide; both male and female secretions moderate, translucent.

Adult female: Subcircular, 1.2 mm. in diameter; the older or spent females with the anal segment usually retracted, giving a kidney shape to the insect as in *aurantii*; the inflated cephalo-thoracic and abdominal segments, except the anal plate, are also strongly chitinized as in *aurantii*; *anal plate* with basal lobules, 0.4 mm. in diameter, but slightly chitinized, rounded; median lobes largest, chitinized, brown, together measuring a little less than 0.04 mm.; second and third lobes much smaller; median lobes with two shoulders; inner shoulder of the second and third lobes minute, sometimes absent in the case of the third lobe, outer shoulders distinct; three low, serrated areas beyond third incision, not always apparent; the posterior point, however, of the first area chitinized, and sometimes assuming the form of a rudimentary third lateral lobe; incisions normal; paraphyses shorter than lobes, narrow, the one extending from the inner base of the median lobes most prominent; plates in median and first and second lateral incisions respectively 2, 2, 3, in length variable, sometimes slightly exceeding lobes, deeply forked at tips; three broad plates in the third incision, oblique at apex, each terminating at the posterior angle in a long spindle-shaped tail; anal opening about the size of the first lateral lobe and about two lobes' length distant from tip; paragenitals 0-1, 3-8, 3-5, scattering; dorsal pores in two prominent rows, extending respectively from the second and third incisions, of 6 to 10 pores each; there are also some scattering lateral pores; basal

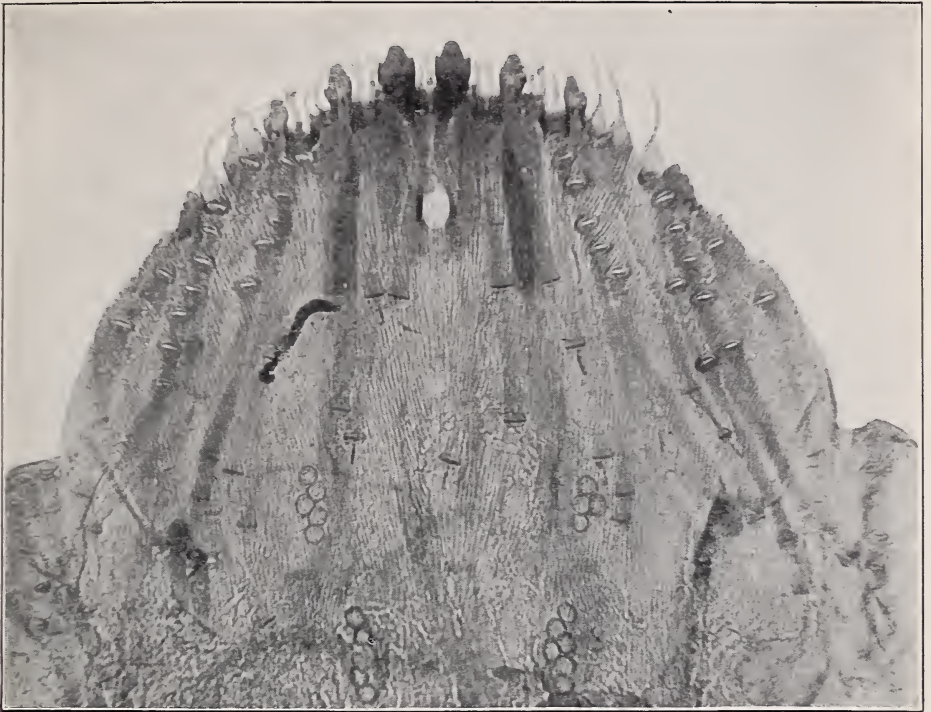


FIG. 1.—ASPIDIOTUS (AONIDIELLA) COCOTIPHAGUS.

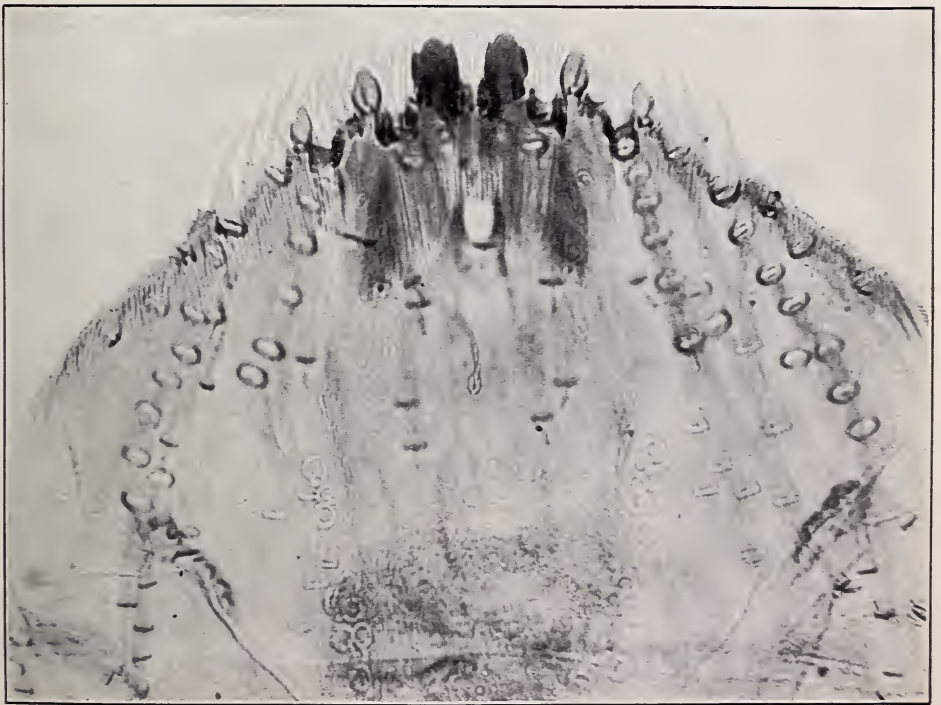


FIG. 2.—ASPIDIOTUS (AONIDIELLA) COCOTIPHAGUS.
ANAL PLATES OF NEW SCALE INSECTS.



FIG. 1.—ASPIDIOTUS (DIASPIDIOTUS) AFRICANUS.

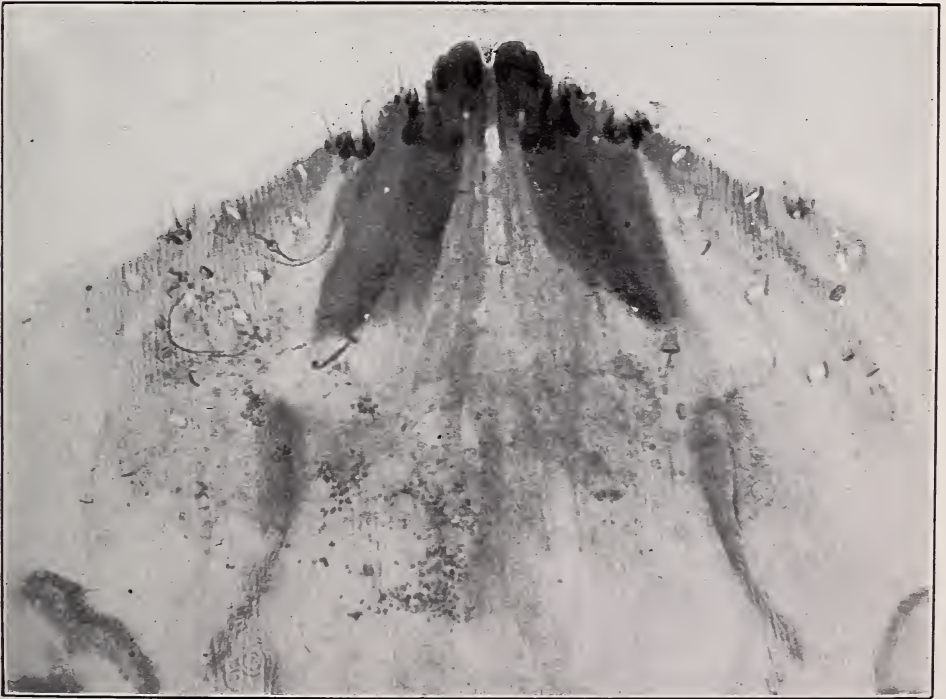


FIG. 2.—ASPIDIOTUS (DIASPIDIOTUS) COURSETIÆ.
ANAL PLATES OF NEW SCALE INSECTS.

thickenings slight, two short central rods and a larger lateral rod; ventral thickenings inconspicuous, represented chiefly by a chitinized line on each side below the first lateral incision.

Type.—Bureau of Entomology No. 14136. Massed on the upper surface of the leaves of cocoanut (*Cocos nucifera*), Santiago de las Vegas, Cuba, collected August, 1904, by Wm. T. Horne, chief of the department of vegetable pathology of the central agricultural experiment station of Cuba. Also on *Citrus trifoliata*, collected by Mr. Horne, Santiago de las Vegas, Cuba, January 13, 1906.

NOTE.—This species seems to be an intermediate one between *Aspidiotus* (*Aonidiella*) *aurantii* and *Aspidiotus* (*Chrysomphalus*) *dictyospermi*. It, however, differs distinctly from both of these species; from *aurantii* by notable differences in the pores, plates, and the presence of paragenitals, and from *dictyospermi* in the shape of the adult female and of the anal plate, and in the character and shape of the plates and lobes. In *aurantii* all the plates are distinctly subbranched and the three broad plates of the third incision have each two prominent apical branches which are distinctly subbranched. In *dictyospermi* the anal plate is much more produced and with much longer paraphyses, and of the three plates of the third incision the two posterior have long, spindle-shaped branches, the anterior plate two short branches. There is a distinct difference also in the shape of the lobes.

The specific variation in point of length of plates relative to lobes, and size of the lobes, position of the anal opening, etc., is illustrated in the two photographs of the anal segment shown on Plate II. The upper figure is from type material on cocoanut and the lower from trifoliolate orange.

ASPIDIOTUS (DIASPIDIOTUS) AFRICANUS n. sp.

(Plate III, fig. 1.)

Scale of female: Dull opaque brown, 1.5 mm. in diameter; circular, moderately convex, with fairly prominent central nipple, and slightly annulated as in *perniciosus*; when rubbed, resinous exuviae appear, and when old and massed the ashen appearance of *perniciosus* is presented.

Scale of male: About 1 mm. long, of normal type.

Adult female: 1 mm. long, oval. *Anal plate* 0.32 mm. broad at base by 0.2 mm. long, normal, not produced. Median lobes like those of *ancylus*, slightly converging toward tip; inner notch practically wanting; lateral lobes wanting or rudimentary, as in the case of *ancylus*; two distinct lateral incisions; paraphyses of first incision heavy, subequal, inner slightly largest; paraphyses of second incision much smaller; minute but distinct paraphyses also are seen at the inner base of the median lobes; plates minute, inconspicuous; spines

rather strongly developed; anal opening circular, near tip; paragenitals often wanting; if present, represented by from 1 to 3 glands only; dorsal pores few, scattering; transverse basal thickenings well developed, laterals separated from the central line and robust; apical ventral chitinization rather strongly developed, brown; ventral longitudinal ridges feebly developed.

Type.—Bureau of Entomology No. 14121.

Material studied: Original lot from Bloemfontein, South Africa, December, 1907, from the Hon. W. J. Palmer, director of agriculture, Orange River Colony. Food plants represented: *Gleditsia triacanthos*, *Schinus molle*, fig (two samples), almond, and quince. This material was abundantly parasitized, but none of the parasites was obtainable for identification. Specimens on *Gleditsia triacanthos* are followed in description, except as to note on paragenitals.

Additional lot from Charles P. Lounsbury, government entomologist, Cape Colony, with letter of January 29, 1908, representing material on pear, Hex River, Cape Colony; Kieffer pear, Prospect Farm, Komgha (east of Cape Colony); fig, Paarl, Cape Colony, and fig and privet from Bloemfontein.

The original lot, received through the Hon. W. J. Palmer, was submitted under the supposition that the insect might prove to be the San Jose scale (*Aspidiotus perniciosus* Comst.), and with the request that an authoritative determination be cabled to Bloemfontein. The insect proved to be entirely distinct from *perniciosus*, and evidently an undescribed species native to South Africa. The general appearance of the scale and insect is strikingly close to the San Jose scale. Even the anal plate bears a close resemblance to the San Jose scale, but lacks the second pair of lobes and presents some other minor differences. In the specimens examined of the first lot paragenitals also seemed to be entirely wanting, although later, in the case of three specimens, scattering pores were found, in some instances rudimentary.

The fact that the insect is distinct from the San Jose scale was cabled to Mr. Palmer, and a letter giving details was sent. Before the receipt of this cablegram the entomologists of South Africa, viz, Mr. Charles P. Lounsbury, Cape Colony; Claude Fuller, Natal; C. W. Howard, Transvaal, and H. Neethling, biologist, Orange River Colony, had held a conference at Bloemfontein and arrived at the conclusion that the South African insect was distinct from *perniciosus*.

The original information given by Mr. Palmer concerning the food habits of this insect is as follows:

In the first place the worst infestations met with thus far occur on the mimosa (*Acacia horrida*), acacia (*Robinia pseudacacia*), pepper (*Schinus molle*), and fig; whereas pear, pecan, and apple trees growing in the worst infested spots have either not been attacked at all, or only to a very slight extent. The distribution over such a large area as it has already spread shows that it must have occurred here for a period of at

least several years, but, in spite of careful search, no tree has been found so badly attacked that its life is threatened; no tree has been found to have actually succumbed to its attack.

The scale is apparently kept in check by an insect enemy, although up to the present no parasites have actually been discovered. In other countries where the scale has become established, it can hardly be said to be kept down by its parasites.

In letter of February 3, 1908, transmitting the report of the conference of entomologists at Bloemfontein, Mr. Neethling states that since the discovery of the insect it has become very destructive to some cultivated plants, notably the fig and privet. The list of plants which it has been found to infest, given in the report referred to, includes the following:

Privet.....	Abundantly infested.
Fig.....	Do.
Honey locust (<i>Gleditsia triacanthos</i>).....	Do.
Pepper (<i>Schinus molle</i>).....	Do.
Apricot.....	Sparsely infested.
Quince.....	Do.
Apple.....	Very rarely and sparsely infested.
<i>Acacia horrida</i>	More or less abundantly infested.
<i>Robinia pseudacacia</i>	Sparsely infested.
<i>Rhus</i> sp.....	Do.

Mr. Lounsbury's communication of January 29, with accompanying specimens, gives further interesting information relative to the insect, and considerably extends its range in South Africa, as already noted. He adds two new food plants for Bloemfontein, namely, willow and poplar. He had also found, in the material which he had studied, particularly in that from South Africa and more rarely in some of the Bloemfontein samples, scattering paragenitals. Following his suggestion the writer gave a second and most careful scrutiny to all the material, with the results in the matter of paragenitals and other features indicated in the concluding notes descriptive of all the material. Mr. Lounsbury states:

I have known the occurrence on the pear for some years and suspect that the infestation went with nursery stock sent out years ago by a certain nurseryman. But we have failed to find the scale on his place and have come to think that it might have been imported by him with French stocks before the days when we fumigated such and that it has since been eliminated. In our notes we have entered the species as "near *ancylus*" and "near *perniciosus*," but the possibility of it being the one at Bloemfontein incorrectly identified as *perniciosus* did not occur to me until I received material of the latter. I have not seen the species away from orchards or habitations, but some Orange River Colony material was found on *Rhus* and mimosa (native plants) under circumstances suggestive of its being indigenous. The pear occurrence at Komgha (east of Cape Colony) was on a few trees in one orchard, and cutting them out seems to have proved eradicated. A few branches were heavily incrustated. The one at Hex River (only 125 miles from here) is also in one orchard only, so far as I know, and here some dozens of trees show the injury by the death of inside wood and spotting of fruit. I can not compare the species with *perniciosus* for *perniciousness*.

The fact that this insect occurs on native plants, as indicated by Mr. Lounsbury, and also that it is rather abundantly parasitized, further emphasizes the probability that it is an indigenous species. Some descriptive notes of the different lots of material follow:

Original material received from W. J. Palmer, Bloemfontein (letter of November 4, 1907):

(1) On *Gleditsia triacanthos*: Type of description.

(2) On *Schinus molle* (pepper tree): Typical, except for a slightly more prominent development of dorsal pores, and a much lighter coloring of the scale secretion. When occurring on this food plant the scale is light yellowish brown, almost buff, but otherwise normal. Such variation in coloring is sometimes seen in the San Jose scale, and may be due purely to the food plant.

(3) On fig: Typical, save for a single anterior lateral circumgenital gland in two females out of eight examined.

(4) On almond: Typical, save for two rudimentary glands in one specimen. These glands in the specimens on fig and almond were not noted in the first examination.

(5) On quince: Typical.

Material received from Charles P. Lounsbury (letter of January 29, 1908):

(1) On pear, Hex River, Cape Colony, November 17, 1907, three females: Typical, except that they show scattering paragenitals, as follows:

0	0	0	0	0	0	0
2-1	0-0	0-1	1-2	3-2	1-1	0-0
1-2	1-1	1-0	1-1	1-1	1-1	0-0

Scales reddish brown, with nipple and ring as in *pernicius*; when rubbed, exposing exuvia as in *pernicius*.

(2) On Kieffer pear, Prospect Farm, Komgha (east of Cape Colony), September, 1905: Scale similar to last, but with central nipple and ring less prominent; pygidium rather produced or triangular; dorsal pores numerous and prominent, arranged in two or more irregular rows on each side, the first extending from the second incision. Paragenitals:

0	0	1	0	0
2-3	2-4	2-2	2-1	1-1
2-2	2-2	2-2	2-2	1-2

(3) On fig, Paarl, Cape Colony, November 8, 1907; 11 females examined: Typical in character of dorsal pores. Paragenitals absent or very few. Color of scales modified by the reddish-brown superficial layers of the bark which are carried over the scale; evidently

approximating the color of the scales of the other specimens. Paragenitals:

	0	0	0
0-0 (two specimens).	2-1	1-0	0-1 (three specimens).
0-0	2-1	0-0	0-0
	0	0	0
	1-1	1-0	1-1 (two specimens).
	1-0	1-3	1-1

(4) On fig, Bloemfontein, November 29, 1907: Substantially typical, one specimen out of six exhibiting two paragenital glands, namely, one each of posterior laterals; with the other five specimens no glands present. Mounted material only.

(5) On privet, Bloemfontein, October, 1907: Typical, except for the presence of scattering paragenitals as follows:

0	0
1-2	3-3
1-1	2-2

Slide mount only, showing two females.

All of this material evidently belongs to the same species. The five lots originally studied show practically no paragenital glands, also general uniformity in dorsal pores, except in the case of specimens on pepper tree.

In all the later material received from Mr. Lounsbury scattering paragenital glands are found in most of the individuals examined. The specimens on fig from Cape Colony and Bloemfontein show a general absence of these glands, or, if present, represented mostly by single glands. In the case of the other food plants, both from Cape Colony and from Bloemfontein, the paragenitals are very scattering, with one or more groups often entirely wanting. Taking the reasonable supposition that all this material represents the same species—and there seems to be no occasion to doubt this judgment—we have evidently a case of a species either in a transition stage, in the matter of the presence or absence of paragenitals, or slightly variable in this feature. The paragenital glands are developed only in the adult stage of the female, and it has long been the belief of the writer that they can not be given very much specific importance. They are always subject to considerable variation, and future studies may prove that, in certain instances where species have been separated chiefly on the presence or absence of these glands, the separation is not justified, as possibly illustrated in the case of *latanix* and *camellix*. In the matter of dorsal pores, the specimens on Kieffer pear, Cape Colony, show a rather unusual development, and the pygidium in the examples studied is rather more produced or triangular; otherwise the agreement is close. Some slight variation in the number of dor-

sal pores is seen in other specimens, notably in the case of the pepper specimens already referred to. This greater development in the number of dorsal pores is not a character of great importance, and much variation in this respect is seen in other species. The abundance of dorsal pores seems to be governed to some extent by climatic conditions, a marked increase being often noted in specimens from arid districts.

The discovery of scattering paragenitals brings this species into close relationship with the *ancylus* native to North America, and places it in a group of species hitherto especially characteristic of the New World. It is interesting to note also that a related but a much more strongly chitinized species, lacking paragenitals, has been recently received from Transcaspian Russia. We know too little of the scale-insect fauna of Asia and Africa to be able to generalize as to what types of species are likely to be met with.

ASPIDIOTUS (DIASPIDIOTUS) COURSETIÆ n. sp.

(Plate III, fig. 2.)

Scale of female: 1.5 mm. in diameter, nearly circular, of medium density, depressed; color grayish, more or less soiled by adhering extraneous matter; exuviae sublateral, covered.

Scale of male: Similar, of normal shape.

Adult female: Length less than 1 mm., of normal peg-top shape, not chitinized; *anal plate* slightly more chitinized than body except for lobes and apical and basal thickenings; median lobes only present; laterals obsolete as in *ancylus*; outer shoulder of median lobes prominent, inner shoulder minute, sometimes practically wanting; paraphyses of two incisions beyond lobes strongly developed; inner paraphyses of first incision terminating in a distinct oval knob lying at right angles to the line of the thickening; spines normal, fairly long; anal opening very minute and in line with the knobbed terminals of the inner paraphyses of first incision. Paragenitals: Anterior laterals, 1-3; posterior laterals, 0-1; dorsal pores few in number, inconspicuous; transverse basal thickenings of dorsal surface in three parts, consisting of a long, straight central line, sometimes broken at middle, and two stronger lateral thickenings in the form of a double curve. The ventral apical divaricating chitinized bands broad and undivided.

Type.—Bureau of Entomology No. 14002. On *Coursetia glandulosa*, Hermosillo, Mexico; collected by Albert Koebele April 23 and 24, 1897 (Koebele No. type material, 1713).

NOTE.—This species is closely allied to *Aspidiotus subsimilis* Ckll. The latter differs in having a more produced pygidium and lobes, the latter without inner shoulder, anus midway of first thickening, paragenitals absent, and in minor characters. This species is scarcely more than a variety of *subsimilis*.

ASPIDIOTUS (DIASPIDIOTUS) TRANSCASPIENSIS n. sp.

(Plate IV, fig. 1.)

Scale of female: 1.5 mm. in diameter, subcircular, of a yellowish or buff color. Exuviae orange, exposed when rubbed or old.

Scale of male: Of normal oval shape, similar in color to the female.

Adult female: Broad, oval, 1 mm. in length; *anal plate* broad, rounded; median lobes only represented; laterals wanting or rudimentary as in the case of *ancylus*; median lobes strongly chitinized, with very deep outer notch forming a rather distinct lobule; inner notch wanting; the two lateral incisions shallow, broad, and with very heavy, robust, bordering paraphyses or thickenings; paraphyses of first incision particularly large, especially the inner one; of second incision, much smaller; plates inconspicuous; spines not especially developed, normal; anal opening near tip, very minute; paragenitals wanting; dorsal pores few, inconspicuous, scattering; median line of basal thickenings subhyaline, inconspicuous; laterals narrow, well chitinized; two prominent longitudinal thickenings bordering the center of the pygidium; ventral thickenings normal, well chitinized.

Type.—Bureau of Entomology No. 8216. On some old dried bark of *Populus*, from Transcaspien Russia, supposed to be from C. Ahnger, of Ashkabad, received November, 1898.

In its rudimentary second and third lobes this species is related to *ancylus*. The important characters are the strongly chitinized median lobes, with prominent external lobule and the prominent longitudinal thickenings, and the absence of paragenitals. In the latter character it falls with the South African species *africanus*, which, however, it does not otherwise closely resemble.

ASPIDIOTUS (HEMIBERLESIA) EPIGÆÆ n. sp.

(Plate IV, fig. 2.)

Scale of female: 1.5 mm. in diameter, subcircular, elevated, more or less conical; exuvia covered but showing as a yellowish spot; larval excretion persistent as a central nipple; color gray, often with purplish tinge, more or less annulated with lighter.

Scale of male: Normal shape, otherwise resembling the female.

Adult female: 0.6 to 0.7 mm. wide by 0.9 mm. long; normal peg-top shape, hyaline in balsam mount; *anal plate* 0.30 to 0.34 mm. in diameter at base, rounded, nearly hyaline; two pairs of well-developed lobes with sometimes a rudimentary third spear-shaped lobe; median lobes much larger than second pair and strongly chitinized, brown, the chitinization ending abruptly at base, not extending into segment except slightly at inner side, giving the base a somewhat irregular oblique termination; median and second pairs of lobes with two subequal small notches; second pair of lobes, and third, if present,

practically hyaline; median pair of lobes together 0.036 mm. in diameter; incisions normal; paraphyses nearly wanting, represented by mere points of chitinization; plates very little exceeding lobes, not very strongly developed but of the general *Hemiberlesia* type, two median narrow, two broader first notch, then three broad followed by two or three simple plates, all plates save last being fingered at tips; spines normal; anal opening large, nearly equaling in size one median lobe, one and one-half lobe's length distant from base of median lobes; paragenitals scattering, linearly arranged, 0-1, 4-7, 4-6; dorsal pores very few, scattering; basal thickenings not prominent, but slightly chitinized, divaricated ventral thickenings not extending beyond anal opening.

Type.—Bureau of Entomology No. 14135, on the ground laurel or trailing arbutus (*Epigæa repens*), Chain Bridge, Va. (near Washington, D. C.), collected by J. G. Sanders, May 6, 1906. Collected also on the same food plant, Sugar Grove, Ohio, by Bertha C. Hite, and donated by Mr. J. G. Sanders.

NOTE.—This species is evidently related to *latanix* of Signoret, but is a smaller species and differs in the notable and peculiar chitinization of the median lobes. It presents considerable variation, some of the smaller or incompletely developed specimens of the last stage of the female showing less chitinization and approaching rather closely in superficial appearance to *townsendi*, and it might easily be determined as this latter species. Its host-plant and occurrence in woodlands indicate that it is a species native to North America.

ASPIDIOTUS (HEMIBERLESIA) MITCHELLI n. sp.

(Plate V, fig. 1.)

Scale of female: Length, 1.5 mm.; subcircular to broad oval, strongly convex, and of the general *camellix* type; secretory matter rather dense, color dull yellowish, due chiefly to the extraneous matter taken up from the surface; exuvix yellowish brown, near the anterior end usually covered. Ventral scale a distinct white flocculent patch, thinnest at the center.

Scale of male: Similar in general appearance to that of the female, but of the normal elongate shape.

Adult female: Normal top-shaped, 0.75 mm. in diameter; in balsam hyaline; *anal plate* a little more yellowed than body, broad, not produced; three pairs of lobes; median lobes truncate, not converging, with two lateral shoulders, separated by a lobe's width, relatively much smaller than the lobes of *camellix*; second lobe minute, spear-shaped, often with outer lateral shoulder; third lobe narrow, spiniform; thickenings of first and second incisions present, subequal, and



FIG. 1.—ASPIDIOTUS (DIASPIDIOTUS) TRANSCASIENSIS.



FIG. 2.—ASPIDIOTUS (HEMIBERLESIA) EPIGÆÆ.
ANAL PLATES OF NEW SCALE INSECTS.

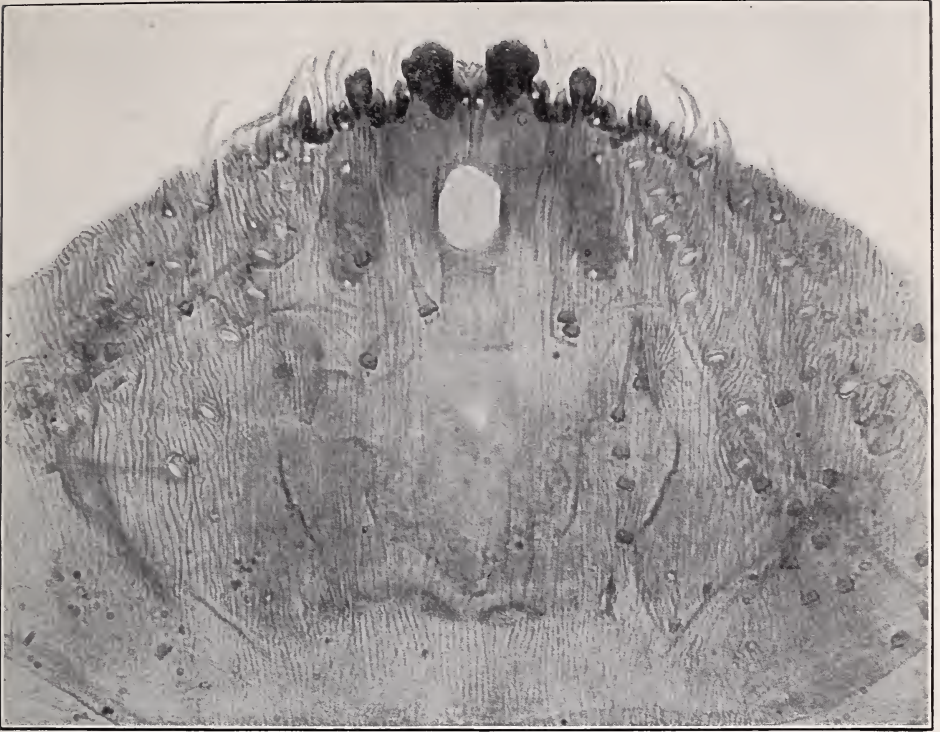


FIG. 1.—ASPIDIOTUS (HEMIBERLESIA) MITCHELLI.

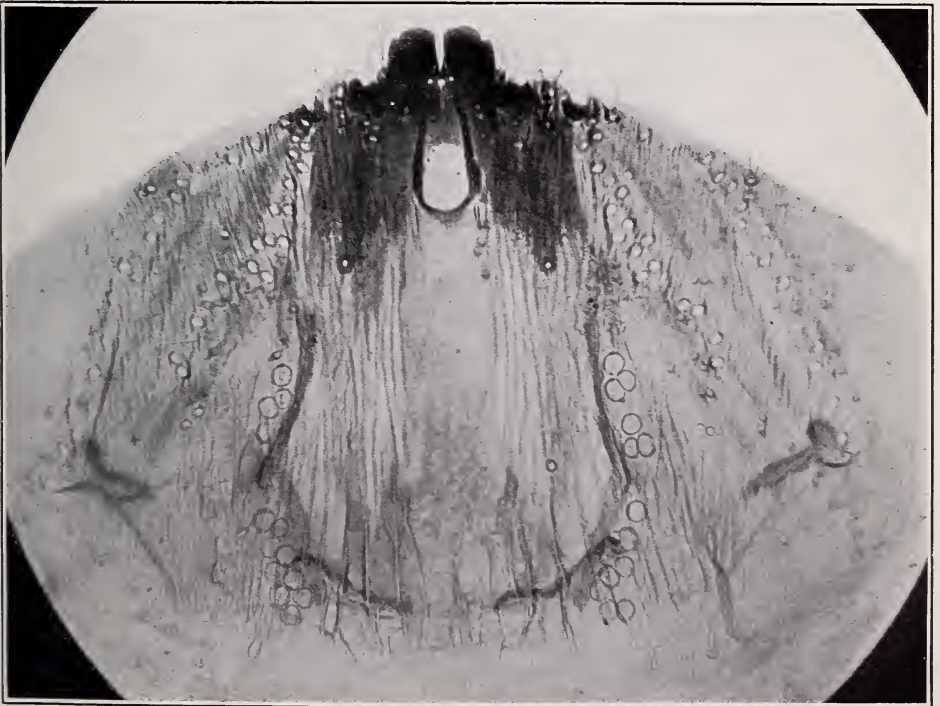


FIG. 2.—ASPIDIOTUS (HEMIBERLESIA) POPULARUM.
ANAL PLATES OF NEW SCALE INSECTS.

together with lobes a little more yellow than the pygidium, but not strongly chitinized; plates numerous, long, filiform, central ones simply branched; spines short, inconspicuous; basal dorsal thickenings not strongly developed or chitinized; anal opening much larger than median lobes, broad oval, about one lobe's length from tip; paragenital pores wanting; dorsal pores not numerous or conspicuous, but with very long (one-half width of pygidium) internal tubes; ventral thickening of integument extending from median lobes practically wanting.

Type.—Bureau of Entomology No. 7695. On thick, narrow, slightly oblanceolate leaves about $1\frac{1}{2}$ inches long; collected by Mr. Charles P. Lounsbury, at Mitchells Pass, South Africa, January 29, 1897.

NOTE.—This species, in character of scale and last segment, is distinctly a *Hemiberlesia*. The anal opening is relatively as large as in *camelliæ*, but the median lobes are much smaller, and the chitinization of the last segment is distinctly less than in *camelliæ*. The scale occurred scatteringly on both surfaces of the leaves.

ASPIDIOTUS (HEMIBERLESIA) POPULARUM n. sp.

(Plate V, fig. 2.)

Scale of female: Length, 2 mm.; broad oval, of the *camelliæ* type; strongly convex; exuviæ near the anterior end, dark brown, the larval exuvia nearly black, normally covered; secretory matter yellowish white, very dense.

Scale of male: Length, 1 to 1.5 mm.; of the normal oval shape, with the larval exuvia showing prominently at one end through scanty secretory covering.

Adult female: Normal top-shaped, in balsam hyaline; 1.5 mm. in diameter; *anal plate* broad, rounded, tip slightly more yellowed than the body; median lobes large, close together, slightly converging, and with two distinct lateral shoulders, often lost in old worn specimens; second and third lobes of *ancylus* type or practically wanting; thickenings of first and second incision prominent, subequal; plates rather short and inconspicuous, doubtless partly lost or reduced by age and use; spines normal; anus very large, broad oval, distinctly larger as a rule than median lobes; paragenitals in four groups, anterior groups 3-9, posterior groups 3-8, often nearly continuous; dorsal pores very numerous, chiefly confined to two irregular double lateral rows extending from the second incision, and a third inconspicuous incision; basal dorsal thickening linear, not especially prominent.

Type.—Bureau of Entomology No. 8370. On cottonwood, from Deming, N. Mex., through Prof. T. D. A. Cockerell, February 9, 1897.

Additional specimens, also on cottonwood, received from Professor Cockerell from Phoenix, Ariz., November 2, 1899.

NOTE.—This species is very closely allied to *camelliæ* and *lataniæ*. In the possession of paragenital pores it comes nearest to the latter species. It differs notably in the great development of the dorsal pores, which seems to be a common characteristic of scale insects in very dry climates, and in the sparsity and shortness of the plates. It is, furthermore, a rather larger species than either of the two mentioned.

AONIDIA JUNIPERI n. sp.

(Plate VI, fig. 1.)

Scale of female: Thin, whitish, slightly tinged with yellow, 1 mm. in diameter, circular in outline, slightly convex. First exuvia very light yellow, easily lost, showing the much darker second stage as a circular central spot through the opening. Second exuvia very large, dark resinous, almost reddish, strongly chitinized and inclosing the adult female, which can be easily removed through the much thinner and delicate ventral skin of this stage.

Scale of male: Unusually large, oval, as large as the second exuvia of the female. Coloration and texture as in female.

Adult female: A little more than half a millimeter in diameter (0.54), of normal peg-top shape, not elongated nor chitinized. *Anal plate*, 0.20 mm. broad by 0.14 mm. long; scarcely chitinized, subhyaline; two small apical, nearly contiguous lobes, laterals wanting; lateral teeth wanting save as produced by the indentations containing the large peripheral dorsal pores, which form, especially toward the apex, distinct incisions; paraphyses and plates wanting; spines minute; anal opening remote from tip; paragenitals wanting; dorsal pores represented by a large central pore lying between the base of the apical lobes and five large lateral pores along the periphery of either side; some few other pores present, but inconspicuous; ventral thickening inconspicuous save the uniform slight chitinization of the pygidium.

Type.—Bureau of Entomology No. 14123. On the fruit of *Juniperus* sp.; from E. G. Titus, Logan, Utah.

This species belongs to the genus *Aonidia*, and is ovo-viviparous, the bodies of the females examined being filled with young ready for emergence.

ASPIDIOTUS (TARGIONIA) CHENOPODII n. sp.

(Plate VI, fig. 2.)

Scale of female: 1.5 to 2 mm. in diameter, subcircular, convex; light buff in color, the secretion covering the larval exuvia whitish; with the loss of the larval exuvia, the light-orange second exuvia appears

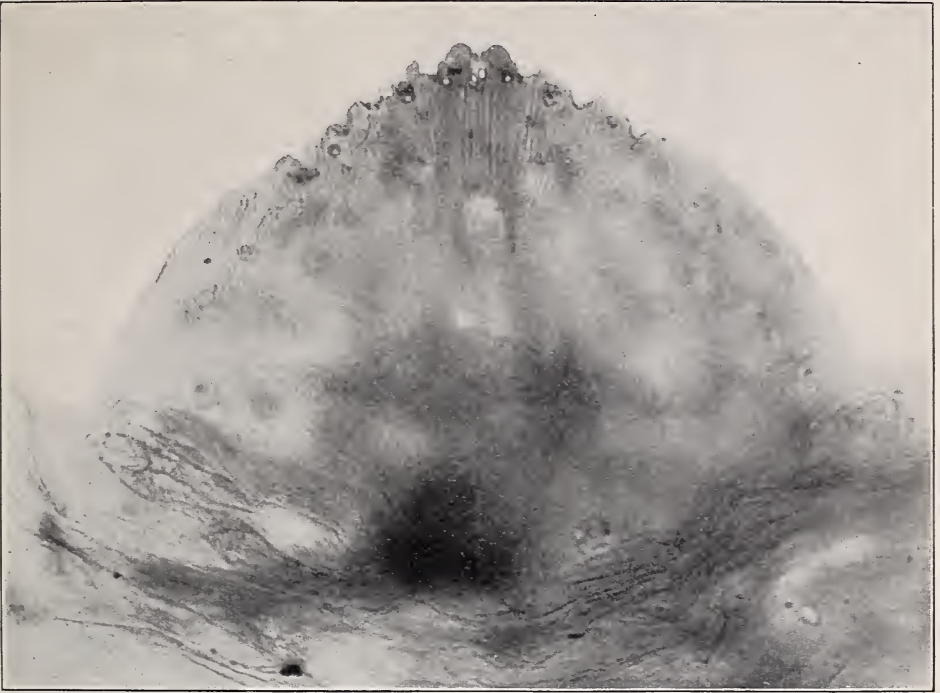


FIG. 1.—AONIDIA JUNIPERI.

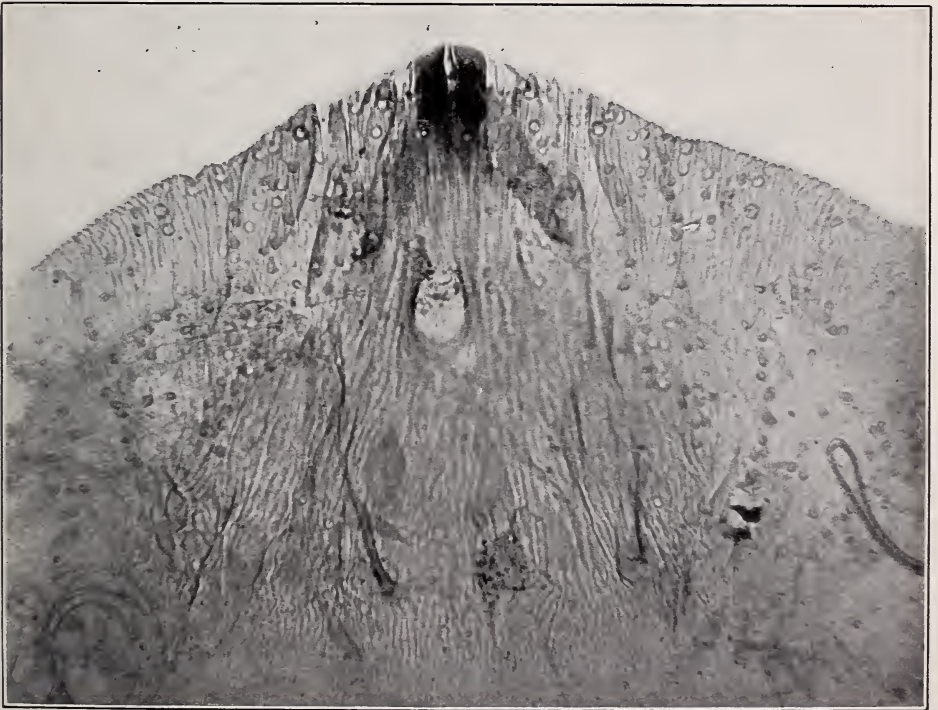


FIG. 2.—ASPIDIOTUS (TARGIONIA) CHENOPODII.
ANAL PLATES OF NEW SCALE INSECTS.

as a conspicuous spot; ventral scale attached to the bark, white, rather abundant.

Scale of male: Elongate, sides nearly parallel; length 1 mm., sometimes slightly more; same general characters as the female, except that the lower secretion remains attached to the upper, forming a definite flattish sac or cocoon which easily separates from the plant.

Adult female: Nearly circular, 1.3 mm. wide by 1.5 mm. long in the larger specimens; hyaline, except anal plate; parastigmatic glands wanting. *Anal plate* about 0.4 mm. in diameter, normally shaped, but slightly chitinized; a single pair of rather contiguous narrow median lobes, chitinized, brown, with a more or less distinct basal chitinized prolongation; lobes oblique at tip, with a produced inner apical angle, closely reproducing the characteristics of the same lobes of *dearnessi*; second and third lobes represented by mere projections; lateral teeth represented by the projections just referred to, which are homologous with the second and third lobes, and by a minute general serration of the edge of the anal plate; first incision deep and containing two short but easily distinguishable plates; second and third incisions minute; paraphyses wanting; plates, except in first incision, as noted, minute or wanting; spines normal; anal opening large, oval, one-third from tip; paragenitals wanting; dorsal pores minute and inconspicuous; basal thickenings inconspicuous or wanting; ventral thickenings not showing more than the generally suffused chitinization of the anal plate, the longitudinal thickenings distinctly inclosing the oval vaginal area.

Type.—Bureau of Entomology No. 14143. Coolabah, New South Wales, on *Chenopodium*; collector, J. G. Smith.

NOTE.—This species is very close structurally to *dearnessi* Ckll., but is much less chitinized. The prominent median lobes are almost exactly like those of *dearnessi*. The latter species, however, has five prominent lateral projections instead of the two inconspicuous ones exhibited by *chenopodii*. The dorsal pores of *chenopodii* are much less conspicuous than in the case of *dearnessi*; the first incision is deep, the plates in this incision are larger and more distinct, and there are other minor differences which, taken together with the wide separation geographically and the different food plants, perhaps warrant giving a specific name to the New South Wales material.

CHIONASPIS MICROPORI n. sp.

(Plate VII, fig. 1.)

Scale of female: 2.5 mm. long, of the normal shape, expanding posteriorly, usually more or less curved; secretion white, smooth, and dense; with distinct ventral scale.

Scale of male: About 1 mm. in length, normally shaped, with distinct median carina.

Adult female (dried specimens): Dark purple, with the eggs or young also dark purple; length 0.9 to 1 mm.; breadth at widest part 0.4 to 0.5 mm., of normal *Chionaspis* type, tapering anteriorly; body nearly hyaline; parastigmal glands variable, sometimes as many as 9. *Anal plate* broader than long, 0.26 by 0.38 mm.; in older specimens distinctly and generally chitinized and brown, nearly hyaline in recently matured females; median lobes touching at base and widely divaricating toward tips; latter rounded. Inner lobe of first lateral pair one-half width of median; outer lobes, same pair, very short and much smaller; second lateral pair represented by the inner lobe only, which is similar to the same lobe of the first lateral pair; outer lobe apparently practically wanting; lateral lobes directed distinctly toward apex of segment; lateral teeth represented only by the projections laterad of the large oblique marginal glands; incisions inconspicuous; paraphyses wanting; plates, including the median, 2, 2, 2, 2, 4-5; spines normal; anal opening one-third or less from base, circular, about the diameter of the first lateral lobe; paragenitals 12-13, 20-29, 18-22; oblique marginal pores 1, 2, 2, 2; dorsal pores small, nearly circular; inner row or group next to paragenitals 7-9; irregular row extending from third incision, more or less in two groups, of some 15 pores altogether; followed by an exterior row of some 12 pores, number of pores, however, variable; basal thickenings inconspicuous or wanting; ventral thickenings the suffused chitinization of the anal plate already noted, slightly heavier below median lobes.

Type.—Bureau of Entomology No. 14144. Collected on poplar, probably *Populus tremula*, at Wu Tai Shan, Shansi, China, by F. N. Meyer. Received February 26, 1908.

LEUCASPIS INDICA n. sp.

(Plate VII, fig. 2.)

Scale of female: White, elongate, narrow, convex, flattened at tip, easily falling from the insect beneath.

Scale of male: Not noted.

Adult female: Entirely inclosed within the swollen, strongly chitinized second stage, latter 0.5 to 0.6 mm. long, elongate oval, dark reddish brown. Adult female hyaline, elongate, sides subparallel. *Anal plate* very minute, about 0.1 mm. in diameter, rounded, longitudinally striate. Margin with a series of elongate plate-like processes; lobes, incisions, and paraphyses wanting. The processes referred to are truncate or slightly spatulate at tip, and are of two lengths; the long ones are the second, fifth, and ninth from the center and are homologous to the lobes of other species; between the median long pair is a central short pair, then beyond the first long plate two other short ones, and beyond the second long plate three



FIG. 1.—CHIONASPIS MICROPORI.

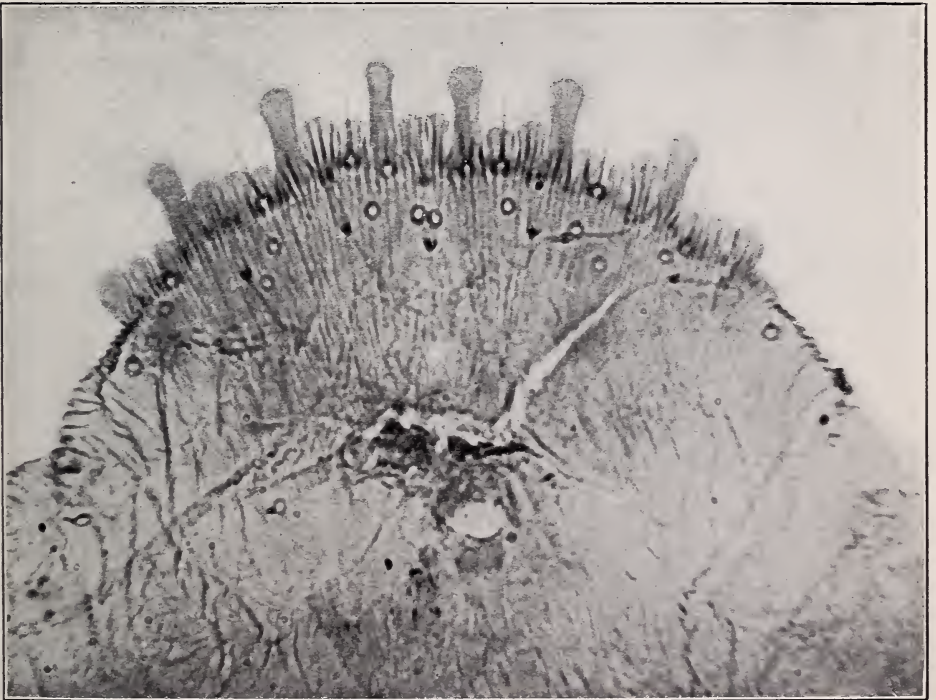


FIG. 2.—LEUCASPIS INDICA.

ANAL PLATES OF NEW SCALE INSECTS.

short ones, and beyond the third three short ones. The marginal spines are normal, and within these is a submarginal row of short spines; anal opening large, nearer base than tip of segment; paragenitals, dorsal pores, and basal and ventral thickenings wanting.

The 5 or 6 abdominal segments preceding the anal plate are very narrow, rather sharply defined, and covered with cross or longitudinal striae.

Type.—Bureau of Entomology No. 14125. On mangoes imported from India, at Miami, Fla., collected by Mr. P. J. Wester, of the Subtropical Laboratory and Garden of the Department of Agriculture, and from Mayaguez, P. R., through D. W. May.

NOTE.—This mango scale is a very interesting species, apparently undescribed, and evidently imported from India with the original sending of the variety of mango on which it occurs, namely, Seed and Plant Introduction and Distribution No. 7108, the Sundersshah. It seems to belong to the genus *Leucaspis*, but the failure to find the male scale leaves this reference in some little doubt. It is certainly unlike any described species of this genus. It occurs thickly massed in the cracks of the bark, and the reddish inflated skins are the second stage, which include the adult insect in a sort of sac, and look like minute eggs or seeds, the whitish waxy covering adhering very loosely and in many cases having been lost off. It has every appearance of being a serious pest, from the dense infestation exhibited.

MYTILASPIS CHILOPSIDIS n. sp.

(Plate VIII, fig. 1.)

Scale of female: More than a millimeter in length, narrow, light purplish in color.

Scale of male: Similar, about one-half the size of the female.

Adult female: A little more than a millimeter long, of normal *Chionaspis* shape, expanding notably posteriorly; anterior and lateral margins smooth, normal. *Anal plate* much broader than long, and but slightly chitinized. Lobes limited to one prominent median pair. Laterals obsolete or represented by slight tooth-like projections. Margin of pygidium somewhat toothed, caused by the projections over each of the large marginal oval pores. Incisions inconspicuous; paraphyses wanting. Plates: 2 median followed on either side by a group of 4 or 5, then 2 or 3; plates somewhat longer than lobes. Spines normal; anal opening very near base of segment. Paragenitals: Anterior 5; anterior laterals 7 to 10; posterior laterals 7 to 9 (from examination of two females). Large marginal pores occurring in three pairs, two each, with a single pair near the base of the segment. Large scattering circular or slightly oval pores over the general area of the pygidium. Basal thickenings wanting; ventral

thickenings limited to a slightly chitinized band about twice the width of the median lobes, extending slightly beyond the anal opening.

Type.—Bureau of Entomology No. 7218. Scatteringly infesting a small section of a plant doubtfully identified as *Chilopsis linearis*; collected by C. H. T. Townsend in Tehuantepec City, Mexico, May 26, 1896.

NOTE.—The females of this insect were gravid with young at time of collection. The distinguishing feature is the absence of the lateral lobes in connection with the rather large prominent median pair.

PARLATORIA MANGIFERÆ n. sp.

(Plate VIII, fig. 2.)

Scale of female: Moderately dense, dark brown, lighter at the edges, oval in outline, usually with slight apical extension; larval exuvia dull greenish. Length 1.5 mm.; breadth 1 to 1.25 mm.

Scale of male: Oval, slightly lighter colored, 1 to 1.3 mm. long by about 0.8 mm. broad. Exuvia more distinctly and purely green than in the case of the female, forming quite a striking contrast with the dull brown of the secretion.

Adult female: 0.65 mm. by 0.75 mm.; of normal rounded, peg-top shape; hyaline, save the anal plate. *Anal plate* 0.45 mm. broad at base by 0.25 mm. long; rounded, rather strongly chitinized throughout median area and marginally; general structure very similar to *pergandei*. Lobes of the *pergandei* type, rather more chitinized. Three pairs of lobes with strong outer shoulder, median lobes with minute inner shoulder also; fourth and fifth lobes triangular, terminating in a point as in *pergandei*; lateral teeth represented by irregular serrations beyond lobes; incisions normal; paraphyses represented by the semi-lunar chitinization at the base of the lobes, unusually heavy; plates resembling those of *pergandei* in general, i. e., two narrow central plates, and two narrow plates in the first and three in the second incision, posterior one minute; the third incision bears three broad, triangular plates, serrated on the exterior margin; following the fourth lobe are four or five similar exteriorly serrated plates; spines normal; anal opening narrow, halfway between tip of segment and vaginal orifice; paragenitals wanting; parastigmals represented by a group of 8 to 10 pores on the inner side of each stigma; dorsal pores large and numerous, represented by 5 more or less regular rows of pores on either side of the center; the central row 3 to 4, the second row 5 to 6, third 8, fourth and fifth scattering. Marginal oval pores decreasing in size from tip to base of segment; basal thickenings practically wanting; ventral thickenings represented by a broad suffused chitinization extending from the tip to the base of segment, and more or less along the margin.



FIG. 1.—MYTILASPIS CHILOPSIDIS.

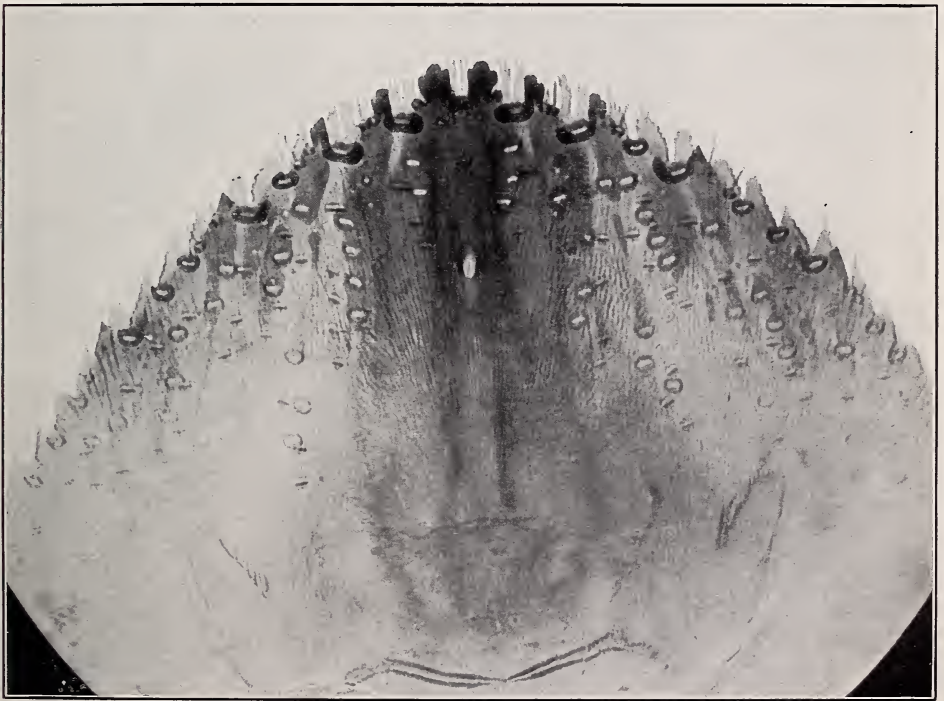


FIG. 2.—PARLATORIA MANGIFERÆ.

ANAL PLATES OF NEW SCALE INSECTS.

Type.—Bureau of Entomology No. 14128. On mango; collected in the Department greenhouses, Washington, D. C., January 28, 1908, by J. G. Sanders, in course of quarantine inspections. Dr. L. Reh, of Hamburg, sent this species for determination June 27, 1904, as from Singapore.

NOTE.—This species is a strongly chitinized *pergandei* lacking paragenital pores and exhibiting a much greater development of dorsal pores. In this last feature it resembles some of the varieties of *pergandei*. It is further distinguished by the more produced, tapering, exteriorly serrated lateral plates occurring in the incision posterior to the fourth lobe, and also on the margin of the segment anterior to this lobe. The large number of small parastigmatic pores is also a marked character.

It occurs massed as thickly as may be on the young mango twigs, and evinces the prolificness characteristic of the genus. It is undoubtedly an offshoot of *pergandei*, and may not deserve more than varietal status.

PARLATORIA PYRI n. sp.

(Plate IX, fig. 1.)

Scale of female: 1 mm. to 1.25 mm. in length, oval; exuviae of larval and second stage and supplementary secretion normal to the genus, the secretion, however, usually terminal, but its position varies somewhat as affected by irregularities of the bark, sometimes sublateral and sometimes more or less inclosing the posterior half at least of the second exuvia. Larval exuvia purplish-green; second exuvia dark olive, almost black, more or less overlaid with a grayish secretion; supplement yellowish.

Scale of male: Larval exuvia as in female; supplemental area broad, circular.

Adult female: Of the normal peg-top shape, 0.8 mm. long by 0.6 mm. broad, hyaline. *Anal plate* distinctly triangular, very slightly chitinized; two pairs of lobes, compressed or close together, the median more than twice the size of the laterals, and both pairs with a deep exterior shoulder; second pair of lobes much lower than median pair; edge of pygidium beyond plates, irregularly obtusely serrated; incisions shallow and inconspicuous; paraphyses wanting, or indicated by a small point of chitinization at inner end of first and second lateral marginal pores; plates short and inconspicuous, not exceeding lobes, and extending a short distance laterally beyond lobes; spines normal; anal opening fairly large, circular, subcentral or nearer base than tip of pygidium. Paragenitals: Anterior group 1 to 4, anterior laterals 8 to 10, posterior laterals 8 to 12. The large oval marginal pores characteristic of the genus are present, 5 to 6 on either margin of the anal plate, with one central one between the median lobes, continued

also, somewhat smaller, on all the abdominal segments, with, on these segments and also to a less extent on the pygidium, numerous smaller oval submarginal pores. Basal and ventral thickenings practically wanting.

Type.—Bureau of Entomology No. 14115. On pear, Chefoo, China, collected October 4, 1901, by the writer. Also infesting cuttings of apple and soft pear, received from the Province of Liaou Yang, Manchuria, through F. N. Meyer (S. P. I. & D. Nos. apple, 20276, 20280; soft pear, 20244 and 20280). Collected by Mr. J. G. Sanders in the course of inspection of Department importations, March 21, 1907.

NOTE.—In the case of the Meyer importations this insect was found very scatteringly present on the cuttings of pear and apple referred to, principally the former, and was associated with the San Jose scale, which was even more sparsely represented. Curiously enough, also, this new *Parlatoria* bears a close superficial resemblance in the balsam mounted female to the San Jose scale, and particularly in the shape of the anal segment and of the produced tip, with two pairs of compressed or closely placed lobes, which are almost of the identical size and shape of *perniciosus*. The plates also are just about the same size and extent as in *perniciosus*. While distinctly a *Parlatoria*, this species lacks the abundant and striking development of the plates which is usually characteristic of the genus. Its occurrence with the San Jose scale and in somewhat greater numbers even than the latter species, and particularly its habitat in the North Temperate region, would indicate, in connection with its host relations, that it has very great possibilities for evil should it gain foothold on this continent. The genus *Parlatoria* is noted for its enormous powers of multiplication, and the possibilities of damage as seen in the case of the chaff scale (*Parlatoria pergandei* Comst.) and the date-palm scale (*Parlatoria blanchardi* Targ.) indicate that this Manchurian *Parlatoria* might develop into a much more dangerous insect even than the San Jose scale. While no parasitism was noted in the case of the *Parlatoria*, some of the San Jose scales associated with it had been parasitized, the parasite, however, not being identifiable from the single fragment found, which was, however, referred by Doctor Howard to the genus *Aphelinus*.

PARLATORIA CHINENSIS, n. sp.

(Plate IX, fig. 2.)

Scale of female: 1 mm. in diameter or less, subcircular, exuviae eccentric, dark metallic olive, similar in general characters to *P. pyri*.

Scale of male: Not seen.

Adult female: About 0.6 mm. broad by 0.7 mm. long (probably old gravid female considerably larger); normally shaped. *Anal plate*

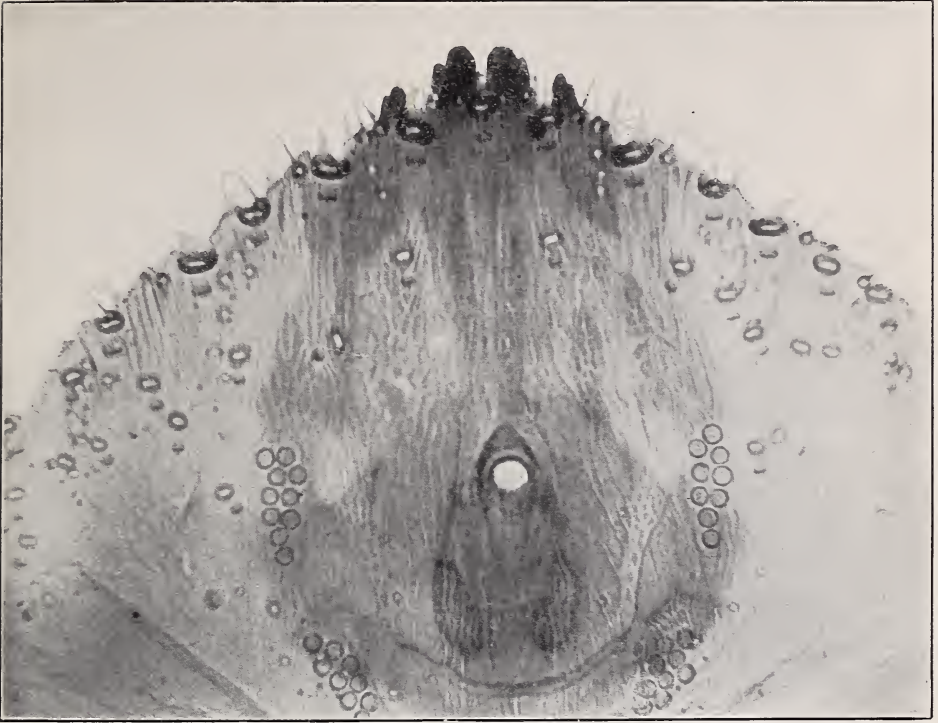


FIG. 1.—*PARLATORIA PYRI*.



FIG. 2.—*PARLATORIA CHINENSIS*.

ANAL PLATES OF NEW SCALE INSECTS.

broad, triangular; width 0.3 mm., length 0.24 mm.; more chitinized than *pyri*: lobes in two pairs; median large, each 0.15 mm. broad, obtusely pointed; inner margin with one notch, outer margin oblique, with four or more fine teeth; second lobe much smaller and lower than median, close to the latter, outer margin oblique, with 2 to 4 minute teeth; incisions normal; paraphyses represented by two rounded, knobbed chitinous processes attached to the inner end of each of the first and second lateral marginal lunar pores, bringing them at or near the outer bases respectively of the median and lateral lobes; plates inconspicuous; between the median lobes and in the first lateral incision two very short, scarcely discernible simple plates; three slightly longer simple plates occur in the second incision; beyond the second incision no plates easily discernible; spines normal; anal opening subcentral, situated just in front of vaginal opening, equaling in diameter width of median lobe; paragenitals in four groups of about 6 pores each, the anterior group apparently not represented in the specimens examined; basal thickenings a distinct narrow line, oblique lateral portion of same character as central and scarcely separated from latter; ventral thickenings diffused, normal.

Type.—Bureau of Entomology No. 14138. On crab-apple, Tientsin, China, October 11, 1901; collector, C. L. Marlatt.

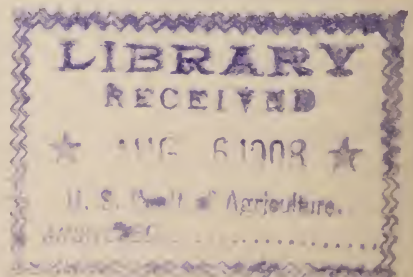
NOTE.—This anomalous *Parlatoria* was first collected by the writer on a small tree, possibly a crab-apple, growing near the railway station at Taira, Japan, August 30, 1901. This tree was thickly infested, and this was the only example of this insect found in Japan. In China the writer collected it at Chefoo on *Hibiscus* (October 4, 1901), and later, October 11, on crab-apple at Tientsin. The latter lot has been indicated as the type material. What is evidently this insect was also collected by the writer (March 12, 1902), in Cairo, Egypt, on an unknown plant, which it infested in conjunction with *Parlatoria affinis* Newst. The Egyptian variety differs slightly in the exterior serration of the median lobes, these serrations or notches being reduced to two or three instead of four or more, and the central lobular projection is somewhat larger. The paragenitals also are less abundant, ranging as follows: 0, 0-3, and 1-2.

The same insect was found on plants imported for the Department of Agriculture by F. N. Meyer, from Peking and northern China, namely, on *Xanthoxylon*, received May 2, 1907, on *Thuja orientalis*, received March, 1908, and on jujube, received April 21, 1908. From these records it is evident that it is a common and widespread species in northern China, and probably will be found to occur throughout eastern Asia. The Egyptian variety may have been a recent importation, or the range of the species may be much wider in the Old World than that indicated.

This insect is remarkably like *Parlatoria pyri* in general appearance and characters, and is very likely closely related to the latter

species, perhaps presenting merely a variety. It differs, however, very notably in the character of the median lobes, which in *pyri* are of the normal *Parlatoria* type, with a deep prominent outer shoulder on each of the lobes. It also differs from *pyri* in the presence of the chitinized processes or paraphyses, which in *pyri* are usually wanting or only faintly indicated, and in the practical absence of the smaller pores, which in *pyri* are found rather abundantly near the margin of the anal and other segments. The anal plate is a little more heavily chitinized, thus bringing out more prominently the basal and ventral thickenings. It occurred very scatteringly, altogether but four females being secured. Like *pyri*, the tip, at a superficial glance, reminds one strongly of *perniciosus*, the effect being produced by the very much smaller, lower, and closely placed second lobes. This species diverges still farther than *pyri* from the normal *Parlatoria* characters. The sparsity of plates and the practical absence of the branched plates along the margin of the anal and other segments, and the sparsity of submarginal and marginal pores, are all features which differentiate it from the normal type of *Parlatoria*. The broad lunar marginal pores of the anal segment, however, are distinctly of the *Parlatoria* character, and the secretions and exuviae are distinctly those of *Parlatoria*.

O



TECHNICAL SERIES, No. 16, PART III.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

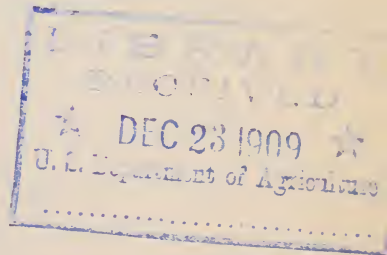
CATALOGUE

OF

RECENTLY DESCRIBED COCCIDÆ—II.

By J. G. SANDERS, M. A.,
Assistant.

ISSUED DECEMBER 22, 1909.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1909.

CONTENTS.

	Page.
Subfamily Monophlebinae.....	33
Subfamily Margarodinae.....	34
Subfamily Ortheziinae.....	35
Subfamily Conchaspinae.....	35
Subfamily Dactylopinæ.....	35
Subfamily Tachardiinae.....	43
Subfamily Coccinae.....	43
Subfamily Diaspinæ.....	48
Abbreviations of literature.....	59

PAPERS ON COCCIDÆ OR SCALE INSECTS.

CATALOGUE OF RECENTLY DESCRIBED COCCIDÆ—II.

By J. G. SANDERS, M. A., *Assistant*.

The preparation of a catalogue of this character requires great vigilance and constant attention to the voluminous literature of entomology, in order that every reference to Coccidæ be noted. Descriptions of new genera and species appear in all conceivable publications in many languages, but the publication of the results of technical entomological research in botanical journals or other periodicals which do not usually treat of entomological subjects can not be too strongly condemned. For decades the publication of names for new species without description, *nomina nudæ*, has been decried. Still there are entomologists who indulge in this unfortunate practice, thereby leading to confusion and error.

In this catalogue, the second of the series,^a are included references to 24 new genera, 195 new species, and 14 new varieties. The writer believes the list quite complete to March, 1909, and asks the assistance of coworkers in adding references which may have been overlooked.

Subfamily **MONOPHLEBINÆ**.**Monophlebus stebbingi octocaudata** Green.

Monophlebus stebbingi var. *octocaudata* Green, Mem. Dep. Ag. India, II, 2, p. 16 (1908).
Maxwell-Lefroy, Mem. Dep. Ag. India, II, 7,
p. 111 (1908). Fig.

Habitat—Lahore, India.

On mango; *Ficus bengalensis*; *F. infectoria*; *F. religiosa*; *F. glomerata*; *F. carica*;
Dalbergia sissu; *Artocarpus integrifolia*.

Monophlebus tamarindus Green.

Monophlebus tamarindus Green, Mem. Dep. Ag. India, II, 2, p. 17 (1908).

Habitat—India.

On branches of tamarind.

^aThe first catalogue of the series was published as Technical Series 12, Pt. I, of this Bureau, and was issued June 5, 1906.

Palæococcus pulcher Leonardi.

Palæococcus pulcher Leon., *Annali di Agr.*, vii, p. 1 (1907). Fig.

Habitat—Java.

On leaves of *Ilex* sp.

Palæococcus rosæ australis (Maskell).

Icerya rosæ var. *australis* Mask., *N. Z. Trans.*, p. 101 (1893). Fig.

Habitat—Australia.

On *Hakea gibbosa*.

Palæococcus theobromæ Newstead.

Palæococcus theobromæ Newst., *Jn. Econ. Biol.*, ii, 4, p. 154 (1908).

Habitat—Calabar, West Africa.

On leaves of cultivated cacao.

Walkeriana cinerea Green.

Walkeriana cinerea Green (sine descr.), *Mem. Dep. Ag. India*, ii, 2, p. 18 (1908).

Maxwell-Lefroy (sine descr.), *Mem. Dep. Ag. India*, ii, 7, p. 121 (1908).

Habitat—India.

On *Acacia arabica*; *Lawsonia alba*.

Icerya minor Green.

Icerya minor Green, *Mem. Dep. Ag. India*, ii, 2, p. 17 (1908). Fig.

Maxwell-Lefroy, *Mem. Dep. Ag. India*, ii, 7, p. 118 (1908). Fig.

Leachia festiva Kieffer, *Marcellia*, vii, p. 163 (1909). Fig.

Habitat—Bengal.

On mango.

^a **Icerya okadæ** Kuwana.

Icerya okadæ Kuwana, *Bul. Ag. Exp. Sta. Japan*, i, 2, p. 178 (1907). Fig.

Ckll., *Can. Ent.*, xli, 2, p. 55 (1909).

Habitat—Japan.

On orange tree (Citrus).

Icerya seychellarum cristata Newstead.

Icerya seychellarum var. *cristata* Newst., *Liverpool Univ. Quart. Jn.*, iii, 6, p. 11 (1908).

Habitat—Madagascar.

Subfamily **MARGARODINÆ**.**Margarodes mediterraneus** Silvestri.

Margarodes mediterraneus Silv., *Bul. Soc. Ent. Ital.*, xxxviii, p. 140 (1906). Fig.

Leon., *Cherm. Ital.*, Fasc. iv, No. 77 (1908).

Habitat—Italy.

On roots of *Cynodon* sp.

Genus **MATSUCOCCUS** Cockerell. Type, *matsumuræ*.

Matsucoccus *Ckll.*, *Can. Ent.*, xli, 2, p. 56 (1909).

To include *Xylococcus matsumuræ* Kuw., *Insect World*, ix, 3, March (1905).

Fig.; Sanders, *Catalogue Coccidæ* (1906); Kuwana, *Bul. Ag. Exp. Sta. Japan*, i, 2, p. 209 (1907). Fig.

^a This species is a synonym of *Icerya seychellarum* (Westwood), which had been previously discovered in China, Formosa, etc.

Genus **STEINGELIA** Nasonow. Type, *gorodetskia*.

Steingelia Nasonow, Ann. Mus. Zool. Imp. Acad. Sc. St. Petersburg, XIII, p. 345 (1908).

Ckll., Can. Ent., XLI, 2, p. 56 (1909).

Steingelia gorodetskia Nasonow.

Steingelia gorodetskia Nasonow, Ann. Mus. Zool. Imp. Acad. Sc. St. Petersburg, XIII, p. 345 (1908).

Ckll., Can. Ent., XLI, 2, p. 56 (1909). Fig.

Habitat—Russia.

Xylococcus macrocarpæ Coleman.

Xylococcus macrocarpæ Coleman, Jn. N. Y. Ent. Soc., XVI, p. 198 (1908). Fig.

Habitat—California.

On *Cupressus macrocarpa*.

Subfamily **ORTHEZIINÆ**.

Orthezia californica Ehrhorn.

Orthezia californica Ehrh., Can. Ent., XXXVIII, p. 329 (1906).

Habitat—California.

On *Bahia* sp.

Orthezia martelli Leonardi.

Orthezia martelli Leon., Bol. Zool. Sc. Sup. Portici, III, p. 150 (1908). Fig.

Habitat—Italy.

On grasses (Graminaceæ).

Subfamily **CONCHASPINÆ**.

Genus **FAGISUGA** Lindinger. Type, *triloba*.

Fagisuga Lindgr., Zeitschr. f. wiss. Insektenbiol., V, 4, p. 107 (1909).

Fagisuga triloba Lindinger.

Fagisuga triloba Lindgr., Berl. Ent. Zeitschr., IV, 5, p. 107 (1909). Fig.

Habitat—Chile.

On *Nothofagus dombeyi*.

Subfamily **DACTYLOPIINÆ**.

Asterolecanium lineare Lindinger.

Asterolecanium lineare Lindgr., Jahrb. Hamb. wiss. Anst., XXVI, p. — (1908).

Habitat—Brazil.

On cocoanut.

Asterolecanium miliaris robusta Green.

Asterolecanium miliaris var. *robusta* Green, Mem. Dep. Ag. India, II, 2, p. 19 (1908).

Maxwell-Lefroy, Mem. Dep. Ag. India, II, 7, p. 121 (1908).

Habitat—Bengal.

On stems of bamboo (*Dendrocalamus* sp.).

Lecaniodiaspis baculifera Leonardi.

Lecaniodiaspis baculifera Leon., *Annali di Agr.*, vii, p. 11 (1907). Fig.

Habitat—Java.

On an undetermined plant.

Lecaniodiaspis frenchii Green.

Lecaniodiaspis frenchii "Green" French (sine descr.), *Victorian Nat.*, xxiii, pp. 184, 240 (1907).

Habitat—Victoria, Australia.

^a Genus **CERCOCOCCUS** Scott. Type *eremobius*.

Cercococcus Scott, *Tr. Linn. Soc. Lond.*, 2d ser., ix, 12, p. 455 (1907). Fig.

Cerococcus Green, *Ent. Mo. Mag.*, xix, p. 42 (1908).

Cerococcus eremobius (Scott).

Cercococcus eremobius Scott, *Trans. Linn. Soc. Lond.*, 2d ser., ix, 12, p. 455 (1907).
Fig.

Cercococcus eremobius Green, *Ent. Mo. Mag.*, xix, p. 42 (1908).

Habitat—Algeria.

On *Helianthemum kahiricum*.

Cerococcus hibisci Green.

Cerococcus hibisci Green, *Mem. Dep. Ag. India*, ii, 2, p. 19 (1908). Fig.

Maxwell-Lefroy, *Mem. Dep. Ag. India*, ii, 7, pp. 122, 135 (1908).

Habitat—Bombay, India.

On branches of *Hibiscus liliiflorus* and *Gossypium* sp.

Solenococcus muratæ (Kuwana).

Cerococcus muratæ Kuwana, *Bul. Ag. Exp. Sta. Japan*, i, 2, p. 180 (1907). Fig.

Solenophora muratæ Ckll., *Can. Ent.*, xli, 2, p. 55 (1909).

Habitat—Japan.

On grape; *Viburnum odoratissimum*.

Kermes bacciformis Leonardi.

Kermes bacciformis Leon., *Bol. Zool. Sc. Sup. Portici*, iii, p. 156 (1908). Fig.

Habitat—Italy.

On *Quercus suber*.

Kermes himalayensis Green.

Kermes himalayensis Green, *Ent. Mo. Mag.*, xx, p. 1 (1909). Fig.

Habitat—Northern India.

On *Quercus incana*.

Kermes miyasakii Kuwana.

Kermes miyasakii Kuwana, *Bul. Ag. Exp. Sta. Japan*, i, 2, p. 181 (1907). Fig.

Habitat—Japan.

On *Quercus serrata*.

Kermes rattani Ehrhorn.

Kermes rattani Ehrh., *Can. Ent.*, xxxviii, p. 329 (1906).

Habitat—California.

On *Quercus chrysolepis*.

^a A synonym of *Cerococcus*, having been described from immature specimens.

Kermes variegatus corticalis Nassonow.

Kermes variegatus corticalis Nass., Ann. Mus. Zool. Ac. Imp. Sc. St. Petersburg, XIII, p. 490 (1909). Fig.

Habitat—Russia.

On bark of *Quercus* sp.

Kermes vastus Kuwana.

Kermes vastus Kuwana, Bul. Agr. Exp. Sta. Japan, I, 2, p. 181 (1907). Fig.

Habitat—Japan.

On *Quercus glandulifera*.

Genus **ATRIPLICIA** Cockerell. Type *gallicola*.

Atriplicia Ckll., Pr. Ent. Soc. Wash., x, p. 169 (1909).

Atriplicia gallicola Cockerell & Rohwer.

Atriplicia gallicola Ckll. & Rohw., Pr. Ent. Soc. Wash., x, p. 169 (1909).

Habitat—Colorado; New Mexico.

On leaves of *Atriplex canescens*.

Eriococcus bahiæ Ehrhorn.

Eriococcus bahiæ Ehrh., Can. Ent., XXXVIII, p. 330 (1906).

Habitat—California.

On roots of *Bahia* sp.

Eriococcus bezzii Leonardi.

Eriococcus bezzii Leon., Bol. Zool. Sc. Sup. Portici, I, p. 148 (1907). Fig.

Cherm. Ital., Fasc. IV, No. 83 (1908).

Habitat—Italy.

On branches and petioles of *Rhododendron ferrugineum*.

Eriococcus catalinæ Ehrhorn.

Eriococcus catalinæ Ehrh., Can. Ent., XXXVIII, p. 332 (1906).

Habitat—California.

On *Artemisia* sp.

Eriococcus howardi Ehrhorn.

Eriococcus howardi Ehrh., Can. Ent., XXXVIII, p. 331 (1906).

Habitat—California.

On *Quercus* sp.

Eriococcus lagerstræmiæ Kuwana.

Eriococcus lagerstræmiæ Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 182 (1907). Fig.

Habitat—Japan.

On *Ficus carica*; *Lagerstræmia indica*.

Eriococcus latialis Leonardi.

Eriococcus latialis Leon., Bol. Zool. Sc. Sup. Portici, I, p. 144 (1907).

Habitat—Italy.

On an undetermined plant.

Eriococcus quercus gilensis Cockerell.

Eriococcus quercus gilensis Ckll., Pr. Ent. Soc. Wash., x, p. 167 (1909).

Habitat—Arizona.

On *Quercus toumeyi*.

Genus **LEFROYIA** Green. Type *castaneæ*.

Lefroyia Green, Mem. Dep. Ag. India, II, 2, p. 21 (1908).

Lefroyia castaneæ Green.

Lefroyia castaneæ Green, Mem. Dep. Ag. India, II, 2, p. 21 (1908). Fig.

Habitat—Assam.

On smaller branches of *Castanea* sp.

Stictococcus multispinosus Newstead.

Stictococcus multispinosus Newst., Jn. Econ. Biol., II, 4, p. 150 (1908).

Habitat—East Africa.

Dactylopius argentinus Dominguez.

Dactylopius argentinus Dominguez, Trab. Mus. Farm. Fac. Cienc. Med., no. 17 (1907).

Dominguez, Bol. Min. Ag., VII, 3, pp. 148, 150 (1907).

Habitat—Argentina.

On Cactaceæ (*Opuntia ficus-indica* and *O. aurantiaca*).

Dactylopius ceylonicus (Green).

Coccus cacti var. *ceylonicus* Green, Ind. Mus. Notes, IV, 1, p. 7 (1896).

Mask., N. Z. Trans., XXIX, p. 319 (1897).

Coccus indicus Green, Mem. Dep. Ag. India, II, 2, p. 28 (1908). Fig.

Habitat—Ceylon; India.

On *Opuntia dillenii*.

^a **Sphærococcus draperi** Newstead.

Sphærococcus draperi Newst., Liverpool Univ. Quart. Jn., I, 2, p. 70 (1906); Agr. News

West Ind., V, 3, p. — (1906).

Draper, Scale Insects of Egypt, p. 12 (1907).

Habitat—Egypt.

On date palm.

Genus **MACROCEROCOCCUS** Leonardi. Type, *superbus*.

Macrocerococcus Leon., Bol. Zool. Sc. Sup. Portici, I, p. 151 (1907).

Macrocerococcus superbus Leonardi.

Macrocerococcus superbus Leon., Bol. Zool. Sc. Sup. Portici, I, p. 152 (1907). Fig.

Marchal, Compt. Rend. Ac. Sci., Paris, CXLIII, 13, p. 872 (1909).

Habitat—Sardinia; Corsica; France.

On stems of an undetermined grass, and on *Lepidium draba*; *Alyssum mediterraneum*; *Lotus*; *Fumaria major*; *Cetarach officinalis*; *Antirrhinum latifolium*.

Phenacoccus cholodkovskyi Marchal.

Phenacoccus cholodkovskyi Marchal, Ann. Soc. Ent. France, LXXVII, p. 245 (1908). Fig.

Habitat—Southern Russia.

On *Triticum vulgare*.

^a This species must be very close to *Phænicococcus marlatti* Ckll., a very common pest of the date palm in Algeria, if it is not indeed identical. The description answers very well for the latter species.

Phenacoccus colemani Ehrhorn.

Phenacoccus colemani Ehrh., Can. Ent., xxxviii, p. 332 (1906).

Habitat—California.

On *Rubus* sp.

Phenacoccus formicarum Leonardi.

Phenacoccus formicarum Leon., Bol. Zool. Sc. Sup. Portici, iii, p. 162 (1908). Fig.

Habitat—Italy.

In nest of ants (*Pheidole pallidula*).

Phenacoccus graminicola Leonardi.

Phenacoccus graminicola Leon., Bol. Zool. Sc. Sup. Portici, iii, p. 160 (1908). Fig.

Habitat—Italy.

On grasses (Graminaceæ).

Phenacoccus hirsutus Green.

Phenacoccus hirsutus Green, Mem. Dep. Ag. India, ii, 2, p. 25 (1908). Fig.

Habitat—India; Tasmania.

“On terminal shoots of an undetermined shrub, attended by ants (*Cremastogaster rogenhoferi*), which had constructed shelters around the colonies of insects.”

Phenacoccus iceryoides Green.

Phenacoccus iceryoides Green, Mem. Dep. Ag. India, ii, 2, p. 26 (1908).

Maxwell-Lefroy, Mem. Dep. Ag. India, ii, 7, p. 129 (1908).

Habitat—Calcutta, Tanjore, Surat, India.

On mango; *Boswellia*; *Capparis horrida*.

Phenacoccus insolitus Green.

Phenacoccus insolitus Green, Mem. Dep. Ag. India, ii, 2, p. 26 (1908). Fig.

Habitat—Bengal.

On *Sida cordifolia*.

***a* Phenacoccus ramonæ** Essig.

Phenacoccus ramonæ Essig, Pomona Jn. Ent., i, 2, p. 44 (1909). Fig.

Habitat—California.

On roots of black sage (*Ramona stachyoides*).

Genus **COCCURA** Sulc. Type, *comari* Kunow.

Coccura Sulc., Nachrichtsbl. Naturforsch.-Klubs, Prossnitz, x, 7 pp. (1907); Lindgr.,

Zeitschr. f. wiss. Insektenbiol., iv, 12, p. 475 (1908).

A new genus for the reception of *Coccus* (*Phenacoccus*) *comari* Kunow, Ent. Nachrichten, vi, p. 46 (1880).

Ceroputo volynicus Nasonow.

Ceroputo volynicus Nass., Ann. Mus. Zool. Ac. Imp. Sc. St. Petersburg, xiii, p. 471 (1909). Fig.

Habitat—Russia.

On leaves and stems of *Dactylis glomerata*.

^a This is undoubtedly an immature stage of *Ceroputo yuccæ* (Coquillett). The lateral patches of spines on each segment, and the incompletely developed 7-jointed antennæ indicate strongly its connection with the latter species.

Genus **LACHNODIELLA** von Ihering. Type, *cecropiæ*.

Lachnodiella von Iher. (sine descr.), Bot. Jahrb., xxxix, 5, p. 680 (1907).

Lachnodiella cecropiæ von Ihering.

Lachnodiella cecropiæ von Iher. (sine descr.), Bot. Jahrb., xxxix, 5, p. 680 (1907).

Habitat—Brazil.

On *Cecropia adenopus*.

Pseudococcus agrifoliæ Essig.

Pseudococcus agrifoliæ Essig, Pomona Jn. Ent., 1, 2, p. 42 (1909). Fig.

Habitat—California.

Beneath bark and in cracks of bark of *Quercus agrifolia*.

Pseudococcus artemisiæ Essig.

Pseudococcus artemisiæ Essig, Pomona Jn. Ent., 1, 2, p. 38 (1909). Fig.

Habitat—California.

“Under bark of *Artemisia californica*.”

Pseudococcus citri coleorum Marchal.

Pseudococcus citri var. *coleorum* Marchal, Ann. Soc. Ent. France, lxxvii, p. 236 (1908).

Habitat—France.

On *Coleus*.

Pseudococcus coffeæ (Newstead).

Dactylopius n. sp. Newst. (sine descr.), Liverpool Univ. Quart. Jn., 1, 2, p. 74 (1906).

coffeæ Newst., Jn. Econ. Biol., iii, 2, p. 37 (1908). Fig.

Habitat—Java.

On Liberian coffee.

Pseudococcus cupressi Coleman.

Pseudococcus cupressi Coleman, Jn. N. Y. Ent. Soc., xvi, p. 197 (1908). Fig.

Habitat—California.

On *Cupressus macrocarpa*.

Pseudococcus (?) cycliger Leonardi.

Pseudococcus cycliger Leon., Bol. Zool. Sc. Sup. Portici, iii, p. 168 (1908). Fig.

Habitat—Italy.

In nest of ants (*Aphenogaster testaceo-pilosus*).

Pseudococcus elongatus Reuter.

^a *Pseudococcus graminis* Reuter, Medd. Soc. Faun. Fenn., p. 66 (1904).

elongatus Reuter, Medd. Soc. Faun. Fenn., p. 251 (1904).

elongatus Sanders, Catalogue Coccidæ, p. 5 (1906).

Habitat—Finland.

On *Phleum pratense*; *Poa pratensis*.

Pseudococcus juniperi Ehrhorn.

Pseudococcus juniperi Ehrh., Can. Ent., xxxviii, p. 333 (1906).

Habitat—Arizona.

On *Juniperus virginiana*.

^a Specific name preoccupied.

Pseudococcus longipes Leonardi.

Pseudococcus longipes Leon., Bol. Zool. Sc. Sup. Portici, III, p. 166 (1908). Fig.
Habitat—Italy.
On *Alocasia macrorhiza*.

Pseudococcus myrmecarius Leonardi.

Pseudococcus myrmecarius Leon., Bol. Zool. Sc. Sup. Portici, III, p. 164 (1908). Fig.
Habitat—Sardinia.
In nest of ants (*Camponotus* sp.).

Pseudococcus obscurus Essig.

Pseudococcus obscurus Essig, Pomona Jn. Ent., I, 2, p. 43 (1909). Fig.
Habitat—California.
"On *Opuntia* and under the bark of *Sambucus glauca*."

Pseudococcus saccharifolii (Green).

Dactylopius saccharifolii Green, Mem. Dep. Ag. India, II, 2, p. 23 (1908).
Maxwell-Lefroy, Mem. Dep. Ag. India, II, 7, p. 124 (1908).
Fig.
Habitat—Bengal.
On leaves of sugar cane.

Pseudococcus (?) takæ (Kuwana).

Dactylopius takæ Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 184 (1907). Fig.
Pseudococcus takæ Ckll., Can. Ent., XLI, 2, p. 55 (1909).
Habitat—Japan.
On bamboo.

Pseudococcus theæcola (Green).

Dactylopius theæcola Green, Mem. Dep. Ag. Ind., I, 5, p. 347 (1907). Fig.
Green, Mem. Dep. Ag. Ind., II, 2, p. 24 (1908).
Habitat—India.
"On roots of tea plants."

Pseudococcus virgatus madagascariensis (Newstead).

Dactylopius virgatus var. *madagascariensis* Newst., Liverpool Univ. Quart. Jn., III, 6, p. 9 (1908). Fig.
Habitat—Madagascar.
"On an unknown plant."

Pseudococcus vovæ Nasonow.

Pseudococcus (Dactylopius) vovæ Nass., Ann. Mus. Zool. Ac. Imp. Sc. St. Petersburg, XIII, p. 484 (1909). Fig.
Habitat—Russia.
On *Juniperus communis*.

Ripersiella kelloggi Ehrhorn.

Ripersiella kelloggi Ckll. (sine descr.), Pr. Biol. Soc. Wash., XIV, p. 166 (1901).
Ehrh., Can. Ent., XXXVIII, p. 334 (1906).
Habitat—California.
On bunch-grass.

Ripersia candidata Cockerell.

Ripersia candidata Ckll., Ann. Mag. N. H. (7), VIII, p. 53 (1901).

"=6-jtd. *R. lasii* from Massachusetts."—(Ckll. in litt.)

Ripersia donisthorpei Newstead.

Ripersia donisthorpei Newst., Ent. Rec. Jn. Variation, XIX, p. 5 (1907). Fig.

Habitat—England.

In nests of *Ponera contracta*.

Ripersia formicarii Newstead.

Ripersia formicarii Newst., Ent. Rec. Jn. Variation, XIX, p. 5 (1907). Fig.

Habitat—England.

Associated with *Lasius flavus*.

Ripersia hypogea Leonardi.

Ripersia hypogea Leon., Bol. Zool. Sc. Sup. Portici, III, p. 176 (1908). Fig.

Habitat—Italy.

Underground.

Ripersia inquilina Leonardi.

Ripersia inquilina Leon., Bol. Zool. Sc. Sup. Portici, III, p. 174 (1908). Fig.

Habitat—Sardinia.

In nest of undetermined ants.

Ripersia japonica Kuwana.

Ripersia japonica Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 186 (1907). Fig.

Habitat—Japan.

Under sheathing, base of leaf of *Miscanthus* sp.

Ripersia libera Leonardi.

Ripersia libera Leon., Bol. Zool. Sc. Sup. Portici, III, p. 170 (1908). Fig.

Habitat—Italy.

On an undetermined grass.

Ripersia (?) oryzæ Kuwana.

Ripersia oryzæ Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 186 (1907). Fig.

Ckll., Can. Ent., XLI, 2, p. 55 (1909).

Habitat—Japan.

On roots of rice (*Oryza*) and other plants.

Ripersia sardiniaë Leonardi.

Ripersia sardiniaë Leon., Bol. Zool. Sc. Sup. Portici, III, p. 173 (1908). Fig.

Habitat—Sardinia.

In nest of ants (*Solenopsis* sp.).

Genus **MICROCOCCUS** Leonardi. Type, *silvestrii*.

Micrococcus Leon., Bol. Zool. Sc. Sup. Portici, I, p. 135 (1907).

Micrococcus silvestrii Leonardi.

Micrococcus silvestrii Leon., Bol. Zool. Sc. Sup. Portici, I, p. 136 (1907). Fig.

Habitat—Sardinia.

In nests of *Tapinoma erraticum*.

Micrococcus similis Leonardi.

Micrococcus similis Leon., Bol. Zool. Sc. Sup. Portici, I, p. 143 (1907). Fig.
Habitat—Sardinia.
On roots of a cereal.

Antonina (?) africana Newstead.

Antonina (?) africana Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, pp. 69,
72 (1906).
Draper (sine descr.), Scale Ins. of Egypt, p. 11 (1907).
Habitat—Egypt.
On "sunt" tree (*Acacia arabica* var. *nilotica*).

Antonina indica Green.

Antonina indica Green, Mem. Dep. Ag. India, II, 2, p. 27 (1908). Fig.
Habitat—Bengal.
On bases of leaves of "hariali" grass.

Antonina phragmitis Marchal.

Antonina phragmitis Marchal, Compt. Rend. Ac. Sci., Paris, CXLIII, 13, p. 872 (1909).
Habitat—France.
On *Phragmites gigantea*.

Subfamily **TACHARDIINÆ**.**Tachardia argentina** Dominguez.

Tachardia argentina Dominguez (sine descr.), An. Soc. Cient. Argentina, p. 219 (1906).
Fig.
Dominguez (sine descr.), Bol. Min. Ag., VII, 3, pp. 148, 150 (1907).
Habitat—Argentina.
On *Acacia cavenia*.

Tachardia decorella theæ Green & Mann.

Tachardia decorella var. *theæ* Green & Mann, Mem. Dep. Ag. India, I, 5, p. 348 (1907).
Green, Mem. Dep. Ag. India, II, 2, p. 28 (1908).
Habitat—India.
On tea.

Subfamily **COCCINÆ**.**Ceronema caudata** Froggatt.

Ceronema caudata Froggatt, n. sp. ——— (?).
Froggatt, Australian Insects, p. 376 (1907).
Habitat—New South Wales, Australia.
On "gum-trees."

Pulvinaria antigoni Green.

Pulvinaria antigoni Green, Tr. Linn. Soc. Lond., XII, 2, pp. 199, 204 (1907). Fig.
Habitat—Seychelles.
On *Antigonon*.

Pulvinaria burkilli Green.

Pulvinaria burkilli Green, Mem. Dep. Ag. India, II, 2, p. 31 (1908). Fig.
Habitat—India.
On leaves of *Croton tiglium*.

Pulvinaria jacksoni Newstead.

Pulvinaria jacksoni Newst., Jn. Econ. Biol., II, 4, p. 155 (1908). Fig.

Habitat—West Africa.

On cacao and *Ficus* sp.

Pulvinaria kuwacola Kuwana.

Pulvinaria kuwacola Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 188 (1907). Fig.

Ckll., Can. Ent., XLII, 2, p. 55 (1909).

Habitat—Japan.

On mulberry.

Pulvinaria orientalis Nasonow.

Pulvinaria orientalis Nass., Ann. Mus. Zool. Ac. Imp. Sc. St. Petersbourg, XIII, p. 493 (1909). Fig.

Habitat—Russia.

On branches of *Haloxylon ammodendron*.

Pulvinaria pluchææ Ehrhorn.

Pulvinaria pluchææ Ehrh., Can. Ent., XXXVIII, p. 334 (1906).

Habitat—California.

On *Pluchea sericea*.

Genus **STOTZIA** Marchal. Type, *striata*.

Stotzia Marchal, Bul. Soc. Ent. Fr., p. 143 (1906).

Stotzia striata Marchal.

Stotzia striata Marchal, Bul. Soc. Ent. Fr., p. 144 (1906).

Habitat—Algeria.

On branches of *Ephedra altissima*.

Genus **EUPHILIPPIA** Berlese & Silvestri. Type, *olivina*.

Euphilippia Berl. & Silv., Redia, III, fasc. 2, p. 396 (1905).

Euphilippia olivina Berlese & Silvestri.

Euphilippia olivina Berl. & Silv., Redia, III, fasc. 2, p. 398 (1905). Fig.

Habitat—Italy.

On olive.

Ceroplastes africanus senegalensis Marchal.

Ceroplastes africanus var. *senegalensis* Marchal, Bul. Soc. Zool. France, XXXIV, p. 68 (1909).

Marchal, Mém. Soc. Zool. France, XXII, p. 168 (1909).

Habitat—Senegal.

On *Acacia arabica*; *A. tortilis*.

Ceroplastes bussei Newstead.

Ceroplastes bussei Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, pp. 71, 74 (1906).

Habitat—Cameroon, West Africa.

On cacao.

Ceroplastes tenuitectus Green.

Ceroplastes tenuitectus Green, Tr. Linn. Soc. Lond., XII, 2, p. 204 (1907). Fig.

Habitat—Aldabra Isl.

On "bois la fumée."

Ceroplastes theobromæ Newstead.

Ceroplastes theobromæ Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, pp. 71, 74 (1906).

Newst. (sine descr.), Scale Ins. of Egypt, p. 16 (1907).

Newst., Jn. Econ. Biol., III, 2, p. 38 (1908).

Habitat—Cameroon, West Africa.

On cacao (*Theobroma cacao*).

Ceroplastes uvariæ Marchal.

Ceroplastes uvariæ Marchal, Bul. Soc. Zool. France, XXXIV, p. 68 (1909).

Marchal, Mém. Soc. Zool. France, XXII, p. 170 (1909). Fig.

Habitat—French Guinea.

On *Uvaria* sp. (Anonaceæ).

Ceroplastes vuilleti Marchal.

Ceroplastes vuilleti Marchal, Bul. Soc. Zool. France, XXXIV, p. 68 (1909).

Marchal, Mém. Soc. Zool. France, XXII, p. 165 (1909). Fig.

Habitat—Senegal.

On *Ormosia laxiflora* (Leguminosæ).

Ceroplastodes chiton Green.

Ceroplastodes chiton Green (sine descr.), Mem. Dep. Ag. India, II, 2, p. 32 (1908).

Habitat—India.

On *Cajanus indicus*.

Coccus gymnospori (Green).

Lecanium gymnospori Green, Mem. Dep. Ag. India, II, 2, p. 29 (1908). Fig.

Habitat—India.

On *Gymnosporia montana*.

Coccus hesperidum javanensis (Newstead).

Lecanium (Trechocorys) hesperidum var. *africanum* Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, p. 74 (1906).

Lecanium hesperidum var. *javanensis* Newst., Jn. Econ. Biol., III, 2, p. 38 (1908). Fig.

Habitat—Java.

On Liberian coffee.

Coccus nicotianæ (Newstead).

Lecanium nicotianæ Newst., Liverpool Univ. Quart. Jn., III, 6, p. 8 (1908). Fig.

Habitat—Madagascar.

On tobacco.

Coccus tuberculatus Kotinsky.

Coccus tuberculatus Kotinsky, Pr. Haw. Ent. Soc., I, pt. 5, p. 168 (1908). Fig.

Habitat—Singapore.

On leaves of unknown tree.

Mesolecanium perditulum Cockerell & Robbins.

Mesolecanium perditulum Ckll. & Robb., Can. Ent., XLI, p. 150 (1909).

Habitat—Nicaragua.

“On bark of small branches of tree No. 2122”—C. F. Baker coll.

Akermes montanus (Green).

Lecanium montanum Green, Mem. Dep. Ag. India, II, 2, p. 30 (1908). Fig.
Habitat—Himalaya Region, India.
On twigs of undetermined shrub.

Genus **PALEOLECANIUM** Sulc. Type, *bituberculatum*.

Palæolecanium Sulc, Ent. Mo. Mag., XIX, p. 36 (1908).

Genus **PARTHENOLECANIUM** Sulc. Type, *coryli*.

Parthenolecanium Sulc, Ent. Mo. Mag., XIX, p. 36 (1908).

Genus **SPHÆROLECANIUM** Sulc. Type, *prunastri*.

Sphærolecanium Sulc, Ent. Mo. Mag., XIX, p. 36 (1908).

Globulicoccus n. subgen. of *Lecanium* auctt. Type, *fuscum*.

Lindgr., Ent. Blätter, Schwabach, III, 8, p. 113; 9, p. 136 (1907).

Lindgr., Ber. Stat. f. Pflanzensch. Hamb., IX, p. 7 (1907).

Lecanium ceconi Leonardi.

Eulecanium ceconi Leon., Bol. Zool. Sc. Sup. Portici, III, p. 178 (1908). Fig.

Habitat—Italy.

On *Menispermum canadense*.

Lecanium glandi (Kuwana).

Lecanium glandi Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 191 (1907). Fig.

Eulecanium glandi Ckll., Can. Ent., XLI, 2, p. 56 (1909).

Habitat—Japan.

On apple, pear, and other trees.

Lecanium kunoensis (Kuwana).

Lecanium kunoensis Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 101 (1907). Fig.

Ckll., Can. Ent., XLI, 2, p. 56 (1909).

Habitat—Japan.

On *Rhamnus japonica*; *Prunus mume*; *Pyrus sinensis*.

Lecanium pulchrum Marchal.

Lecanium pulchrum King (sine descr.), Allg. Zeits. f. Ent., VIII, p. 410 (1903).

Eulecanium pulchrum Sanders, Catalogue Coccidæ, p. 9 (1906).

Lecanium rubellum Lindgr., Ent. Blätter, Schwabach, III, 9, p. — (1907).

Lindgr., Ber. Stat. f. Pflanzensch. Hamb., IX, p. 7 (1907).

pulchrum Marchal, Ann. Soc. Ent. France, LXXVII, p. 304 (1908). Fig.

Habitat—Germany.

On *Calluna vulgaris*; *Ulex europæus*; *Rosa arvensis*; *Rubus* sp.; *Sarothamnus scoparius*.

Lecanium sericeum Lindinger.

Lecanium sericeum Lindgr., Insekten Börse, XXIII, p. 147, Sept. (1906). Fig.

Lecanium (Globulicoccus) sericeum Lindgr., Ent. Blätter, Schwabach, III, 8 and 9 (1907).

Lindgr., Ber. Stat. f. Pflanzensch. Hamb., IX, p. 7 (1907).

Habitat—Bavaria.

On *Abies pectinata*.

Paralecanium cocophyllæ Banks.

Paralecanium cocophyllæ Banks, Philippine Jn. Sci., I, 3, pp. 223, 235 (1906). Fig.
Habitat—Philippines.
On cocoanut palm.

“**Lecanium**” *montonoæ* Newstead.

Lecanium montonoæ Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, p. 69 (1906).
montonoai Lindgr. (sine descr.), Ent. Wochenblatt, xxiv, 5, p. 19 (1907).
Habitat—Egypt.

“**Lecanium**” *nishigaharæ* Kuwana.

Lecanium nishigaharæ Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 192 (1907). Fig.
Habitat—Japan.
On mulberry (*Morus* sp.).

Genus **HEMILECANIUM** Newstead. Type, *theobromæ*.

Hemilecanium Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, pp. 71, 74 (1906).
Newst., Jn. Econ. Biol., III, 2, p. 39 (1908).

Hemilecanium theobromæ Newstead.

Hemilecanium theobromæ Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, pp. 71, 74 (1906).
Newst. (sine descr.), Scale Ins. of Egypt, p. 16 (1907).
Newst., Jn. Econ. Biol., III, 2, p. 39 (1908). Fig.

Habitat—Cameroon, West Africa.

On *Theobroma cacao*.

^a Genus **HOUARDIA** Marchal. Type, *troglodytes*.

Houardia Marchal, Compt. Rend. Soc. Biol., Paris, LXVI, p. 586 (1909).

Houardia troglodytes Marchal.

Houardia troglodytes Marchal, Compt. Rend. Soc. Biol., Paris, LXVI, p. 586 (1909).
Marchal, Bull. Soc. Zool. France, xxxiv, p. 73 (1909).
Marchal, Mém. Soc. Zool. France, xxii, p. 171 (1909). Fig.

Habitat—Senegal.

In tunnels in branches of *Balanites* (*Agialida ægyptiaca*) inhabited by ants of the genus *Cremastogaster* near *kneri* Mayr.

Lecanopsis mirmecophila Leonardi.

Lecanopsis mirmecophila Leon., Bol. Zool. Sc. Sup. Portici, III, p. 181 (1908). Fig.
Habitat—Sardinia.
In nest of ants (*Tetramorium cæspitum*).

Aclerda biwakoensis Kuwana.

Aclerda (?) *biwakoensis* Kuwana, Bul. Ag. Exp. Sta. Japan, I, 2, p. 187 (1907). Fig.
Ckll., Can. Ent., xli, 2, p. 55 (1909).

Habitat—Japan.

On *Phragmites communis*.

^a An unfortunate name, because of its similarity to *Howardia* Berlese & Leonardi, a genus of Diaspine Coccidæ.

Subfamily **DIASPINÆ**.**Chionaspis etrusca** Leonardi.

- Chionaspis etrusca* Leon., *Annali di Agr.*, VIII, p. 44 (1908).
 Leon., *Bol. Zool. Sc. Sup. Portici*, III, p. 184 (1908). Fig.
 Leon., *Cherm. Ital.*, IV, No 88 (1908).

Habitat—Italy.
 On *Tamarix* sp.

Chionaspis gryphæformis Newstead.

- Chionaspis gryphæformis* Newst. (sine descr.), *Liverpool Univ. Quart. Jn.*, I, 2, p. 71 (1906).
cryphæformis Draper (sine descr.), *Scale Ins. of Egypt*, p. 15 (1907). Cairo.

Habitat—Egypt.
 "On four unnamed plants; one a conifer."

Chionaspis inday Banks.

- ^a*Chionaspis candida* Banks, *Philippine Jn. Sci.*, I, 3, pp. 222, 232 (1906). Fig.
Chionaspis inday Banks, *Philippine Jn. Sci.*, I, 7, p. 787 (1906).

Habitat—Philippines.
 On coconut palm.

Chionaspis manni Green.

- Chionaspis manni* Watt & Mann (sine descr.), *Pests and Blights of Tea Plant*, 2nd ed., p. 309 (1903).
 Green, *Mem. Dep. Ag. India*, I, 5, pp. 342, 344 (1907). Fig.
 Mann, *Mem. Dep. Ag. India*, I, 5, p. 351 (1907).
 Green, *Mem. Dep. Ag. India*, II, 2, p. 37 (1908).

Habitat—India.
 On tea; *Ficus* sp.; *Solanum melongena*.

Chionaspis micropori Marlatt.

- Chionaspis micropori* Marlatt, *Bul. U. S. Bur. Ent.*, t. s. 16, pt. 2, p. 25 (1908). Fig.
 Habitat—Shansi Province, China
 On *Populus tremula*.

Chionaspis vuilleti Marchal.

- Chionaspis vuilleti* Marchal (sine descr.), *Compt. Rend. Soc. Biol.*, LXVI, p. 587 (1909).
 Marchal, *Bul. Soc. Zool. France*, XXXIV, p. 69 (1909).
 Marchal, *Mém. Soc. Zool. France*, XXII, p. 175 (1909). Fig.

Habitat—Guinea.
 On gum copal (*Copaifera guibourtiana*?)

Diaspis barberi Green.

- Diaspis barberi* Green, *Mem. Dep. Ag. India*, II, 2, p. 35 (1908). Fig.
 Habitat—Tanjore, India.
 On branches of *Loranthus* sp.

Diaspis (?) ericicola Marchal.

- Diaspis (Adiscodiaspis) ericicola* Marchal, *Compt. Rend. Ac. Sci., Paris*, CXLVIII, 13, p. 871 (1909).
 Habitat—France.
 On *Erica arborea*.

^aSpecific name preoccupied.

Aulacaspis javanensis Newstead.

Aulacaspis (Diaspis) javanensis Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, p. 74 (1906).

Aulacaspis javanensis Newst., Jn. Econ. Biol., III, 2, p. 35 (1908). Fig.

Habitat—Java.

“On various plants.”

Aulacaspis penzigi Leonardi.

Aulacaspis penzigi Leon., Annali di Agr., VII, p. 14 (1907). Fig.

Habitat—Java.

On leaves of *Ilex* sp.

Aulacaspis tubercularis Newstead.

Aulacaspis (Diaspis) tubercularis Newst., Liverpool Univ. Quart. Jn., I, 2, p. 73 (1906).

Aulacaspis cinnamomi Newst., Jn. Econ. Biol., III, 2, p. 34 (1908). Fig.

Habitat—Java.

On *Cinnamomum zeylanicum*.

Hemichionaspis aspidistræ gossypii Newstead.

Chionaspis (Hemichionaspis) aspidistræ var. *gossypii* Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, p. 74 (1906).

Newst., Jn. Econ. Biol., III, 2, p. 37

(1908).

Habitat—Java.

On *Gossypium hirsutum*.

Hemichionaspis fici Green.

Hemichionaspis fici Green, Mem. Dep. Ag. India, II, 2, p. 37 (1908). Fig.

Habitat—Bengal.

On stems of *Ficus glomerata*.

Hemichionaspis minima Green.

Hemichionaspis minima Green, Mem. Dep. Ag. India, II, 2, p. 38 (1908). Fig.

Habitat—Bengal.

On leaves of “Banian” tree (*Ficus* sp.).

Hemichionaspis orlandi Leonardi.

Hemichionaspis orlandi Leonardi, Redia, III, p. 5 (1906). Fig.

orlandii Lindgr., Ent. Wochenblatt., XXIV, 5, p. 19 (1907).

Habitat—Brazil.

“Underside of leaves of an undetermined plant.”

Pinnaspis javanica Leonardi.

Pinnaspis javanica Leon., Annali di Agr., VII, p. 17 (1907). Fig.

Habitat—Java.

On leaves of *Ilex* sp.

Pinnaspis rombica Leonardi.

Pinnaspis rombica Leon., Annali di Agr., VII, p. 16 (1907). Fig.

Habitat—Java.

On leaves of *Persea* sp.

Genus **ACTENASPIS** Leonardi. Type, *pusilla*.

Actenaspis Leon., Annali di Agr., vi, p. 25 (1906). Fig.

A new genus from *Leucaspis* auctt.

Genus **ANAMASPIS** Leonardi. Type, *loewi*.

Anamaspis Leon., Annali di Agr., vi, p. 22 (1906). Fig.

A new genus from *Leucaspis* auctt.

Leucaspis affinis Leonardi.

Leucaspis affinis Leon., Annali di Agr., vi, p. 4 (1906). Fig.

Habitat—France.

On *Pinus sylvestris*.

Leucaspis ephedræ Marchal.

Leucaspis ephedræ Marchal, Bul. Soc. Zool. France, xxxiv, p. 59 (1909).

Habitat—Algeria.

On *Ephedra corsoniana*.

Leucaspis indica Marlatt.

Leucaspis indica Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 26 (1908). Fig.

Habitat—Miami, Fla., and Mayaguez, P. R.; imported from India.

On mango.

Leucaspis pistaciæ Lindinger.

Leucaspis pistaciæ Lindgr., Jahrb. Hamb. wiss. Anst., xxiii, p. 403 (1906).

Habitat—Cyprus.

On leaves of *Pistacia lentiscus*.

^a **Leucodiaspis** Sign. < Lindinger, Jahrb. Hamb. wiss. Anst., xxv (1908). Not valid.

Adiscofiorinia (n. g. of *Fiorinia*), Leonardi, Redia, iii, pp. 17, 52 (1906).

Anamefiorinia (n. g. of *Fiorinia*), Leonardi, Redia, iii, pp. 17, 48 (1906).

Trulliflorinia (n. g. of *Fiorinia*), Leonardi, Redia, iii, pp. 17, 41 (1906).

Fiorinia atalantiæ Leonardi.

Fiorinia (*Adiscofiorinia*) *atalantiæ* Leon., Redia, iii, p. 54 (1906). Fig.

Habitat—Ceylon.

On *Atalantia zeylanica*.

^a Lindinger resurrects *Leucodiaspis* Sign. for *Leucaspis*, and assigns to it all the species formerly known under the latter name, and refers to *Leucospis* Fab., Syst. Entom., p. 361, Nr. 114 (1775) (Hymenoptera). The latter name has no reference or connection with *Leucaspis* Targ.-Tozz., a genus of Coccidae erected in 1869. *Leucodiaspis* credited by Signoret [Ann. Soc. Ent. France, ix, p. 99 (1869)] to Targioni-Tozzetti is an error in spelling and of no value.

The following reference to *Leucaspis* appears in Atti Soc. Ital. di Sci. Nat., xi, p. 734 (1869), which establishes its validity:

“COCCIDARUM CATALOGUS Targ.-Tozz.

“Gen. 22. *Leucaspis* nob. Gen. n.

“Sp. 1. *Leucaspis candida* nob. *Diaspis candida* nob. 1867.

“Sp. 2. *Leucaspis* Signoreti nob. n. sp. 1868 (a D. Signoreti recepta, Pini sp. incola).”

Fiorinia diaspiformis Newstead.

Fiorinia diaspiformis Newst. (sine descr.), Liverpool Univ. Quart. Jn., I, 2, p. 74 (1906).
diaspitiformis Lindgr. (sine descr.), Ent. Wochenblatt., xxiv, 5, p. 20 (1907).
diaspiformis Newst., Jn. Econ. Biol., III, 2, p. 35 (1908). Fig.

Habitat—Java.

On *Piper* sp.

Fiorinia hirsuta Marchal.

Fiorinia hirsuta Marchal, Bul. Soc. Ent. Fr., p. 145 (1906).

Habitat—Algeria.

On *Nephelium longana* and other Sapindaceæ.

Fiorinia juniperi Leonardi.

Fiorinia juniperi Leon., Redia, III, p. 39 (1906). Fig.

Habitat—Ceylon.

On *Juniperus bermudiana*.

Fiorinia macroprocta (Leonardi).

Trulliflorinia macroprocta Leon., Annali di Agr., VII, p. 19 (1907). Fig.

Habitat—Java.

On leaf of *Raphis flabelliformis*.

Fiorinia odinæ Leonardi.

Fiorinia odinæ Leon., Redia, III, p. 24 (1906). Fig.

Habitat—Ceylon.

On *Odina woodice*.

Fiorinia rubrolineata Leonardi.

Fiorinia (Trulliflorinia) rubrolineata Leon., Redia, III, p. 44 (1906). Fig.

Habitat—Ceylon.

On *Murraya exotica*.

Fiorinia tumida Leonardi.

Fiorinia tumida Leon., Redia, III, p. 38 (1906). Fig.

Habitat—Ceylon.

On *Grewia* sp.

Aspidiotus africanus Marlatt.

Aspidiotus (Diaspidiotus) africanus Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 15 (1908). Fig.

Habitat—South Africa.

On fig; apricot; almond; apple; quince; pear; privet; honey-locust (*Gleditsia triacanthos*); *Schinus molle*; *Acacia horrida*; *Robinia pseudacacia*; *Rhus* sp.

Aspidiotus cecconi (Leonardi).

Hemiberlesia cecconi Leon., Bol. Zool. Sc. Sup. Portici, III, p. 188 (1908). Fig.

Habitat—Sardinia.

On *Osirys alba*.

Aspidiotus cocotiphagus Marlatt.

Aspidiotus (Aonidiella) cocotiphagus Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 14 (1908). Fig.

Habitat—Santiago de las Vegas, Cuba.

On *Cocos nucifera*: *Citrus trifoliata*.

Aspidiotus comperei Marlatt.

Aspidiotus (s. str.) *comperei* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 12 (1908).

Fig.

Habitat—W. Australia.

On *Hake* sp. and an undetermined plant.

Aspidiotus corticis-pini Lindinger.

Aspidiotus corticis-pini Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. — (1908).

Habitat—Japan.

On *Pinus densiflora*.

Aspidiotus coursetiæ Marlatt.

Aspidiotus (*Diaspidiotus*) *coursetiæ* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 20 (1908). Fig.

Habitat—Mexico.

On *Coursetia glandulosa*.

Aspidiotus densiflora Bremner.

Aspidiotus densiflora Bremner, Can. Ent., xxxix, p. 366 (1907). Fig.

Habitat—California.

On leaves of *Quercus densiflora*.

Aspidiotus eglandulosus Lindinger.

Aspidiotus eglandulosus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. — (1908).

Lindgr., Ber. Stat. f. Pflanzensch. Hamb., x, p. 10 (1908).

Habitat—Guatemala; Panama.

On *Cereus*; "auf Kakteen."

Aspidiotus elæidis Marchal.

Aspidiotus elæidis Marchal (sine descr.) Compt. Rend. Soc. Biol., lxvi, p. 587 (1909).

Marchal, Bul. Soc. Zool. France, xxxiv, p. 69 (1909).

Marchal, Mém. Soc. Zool. France, xxii, p. 179 (1909). Fig.

Habitat—Dahomey.

On oil palm (*Elæis guineensis*).

Aspidiotus epigææ Marlatt.

Aspidiotus (*Hemiberlesia*) *epigææ* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 21 (1908). Fig.

Habitat—Virginia; Ohio.

On trailing arbutus (*Epigæa repens*).

Aspidiotus herculeanus Doane and Hadden.

Aspidiotus herculeanus Doane and Hadden, Can. Ent., xli, p. 298 (1909). Fig.

Habitat—Society Islands.

On bark of unknown plant.

Aspidiotus labiatarum Marchal.

Aspidiotus (*Evaspidiotus*) *labiatarum* Marchal, Compt. Rend. Ac. Sci., Paris, cxlviii, 13, p. 872 (1909).

Habitat—Corsica.

On *Stachys glutinosa* and *Teucrium capitatum*.

Aspidiotus lectularius Green.

Aspidiotus lectularius "Green" French (sine descr.), Victorian Nat., xxiii, p. 184 (1907).
Habitat—Victoria, Australia.

Aspidiotus meyeri Marlatt.

Aspidiotus (s. str.) *meyeri* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 13 (1908). Fig.
Habitat—Peking, China.
On *Abies* sp.

Aspidiotus mitchelli Marlatt.

Aspidiotus (*Hemiberlesia*) *mitchelli* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 22 (1908). Fig.
Habitat—Mitchell's Pass, South Africa.
"On thick, narrow, slightly oblanceolate leaves about 1½ in. long."

Aspidiotus popularum Marlatt.

Aspidiotus (*Hemiberlesia*) *popularum* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 23 (1908). Fig.
Habitat—Arizona; New Mexico.
On cottonwood (*Populus* sp.).

Aspidiotus privignus Lindinger.

Aspidiotus privignus Lindgr., Zeitschr. f. wiss. Insektenbiol., v, 5, 7 & 8, p. 151 (1909).
Fig. in No. 5.
Habitat—Italy; Greece.
On *Hypericum coris*; *Thymelæa tarton* (?).

Aspidiotus trabuti Marchal.

Aspidiotus (*Hemiberlesia*) *trabuti* Marchal, Bul. Soc. Zool. France, xxxiv, p. 59 (1909).
Habitat—Algeria.
On *Ephedra altissima*.

Aspidiotus transcaspensis Marlatt.

Aspidiotus (*Diaspidiotus*) *transcaspensis* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 21 (1908). Fig.
Habitat—Transcaspian Russia.
On *Populus* sp.

Aspidiotus vUILLETi Marchal.

Aspidiotus (*Hemiberlesia*) *vUILLETi* Marchal, Compt. Rend. Soc. Biol., LXVI, p. 587 (1909).
Marchal, Bul. Soc. Zool. France, xxxiv, p. 73 (1909).
Marchal, Mém. Soc. Zool. France, xxii, p. 178 (1909). Fig.
Habitat—Senegal.
On branches of *Balanites* sp.

Aspidiotus yulupæ Bremner.

Aspidiotus yulupæ Bremner, Can. Ent., xxxix, p. 367 (1907). Fig.
Habitat—California.
On *Quercus lobata*.

Pseudaonidia ferox (Lindinger).

Selenaspidus ferox Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, pp. 4, 7 (1909). Fig.
Habitat—Gold Coast, West Africa.
On Euphorbiaceæ.

Pseudaonidia gracilis (Lindinger).

Selenaspidus gracilis Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, pp. 4, 10 (1909). Fig.
Habitat—Kamerun, West Africa.
On leaves of *Agelais fragrans* and *Tricalysia* sp.

Pseudaonidia greeni Marlatt.

Pseudaonidia greeni Marlatt, Pr. Ent. Soc. Wash., ix, pp. 135, 138, 140 (1908).
Habitat—Java.
On mangosteen and mango.

Pseudaonidia junctiloba Marlatt.

Pseudaonidia junctiloba Marlatt, Pr. Ent. Soc. Wash., ix, pp. 135, 138 (1908).
Habitat—Victoria, Australia.
On *Acacia* sp.

Pseudaonidia kamerunica (Lindinger).

Selenaspidus kamerunicus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, pp. 4, 7 (1909).
Fig.
Habitat—Kamerun, West Africa.
On palms.

Pseudaonidia lounsburyi Marlatt.

Pseudaonidia (Selenaspidus) lounsburyi Marlatt, Pr. Ent. Soc. Wash., ix, pp. 134, 136, 139 (1908).
Habitat—South Africa.
On *Mesembryanthemum edule*.

Pseudaonidia magna (Lindinger).

Selenaspidus magnus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, pp. 4, 9 (1909). Fig.
Habitat—Abyssinia.
On *Euphorbia* sp.

Pseudaonidia silvatica (Lindinger).

Selenaspidus silvaticus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, pp. 4, 10 (1909). Fig.
Habitat—Kamerun, West Africa; Amani, East Africa.
On Anacardiaceæ; *Rinorea exappendiculata*; *Ficus indica*; *Bandeiræa speciosa*.

Genus **FURCASPIS** Lindinger. Type, *biformis*.

Furcaspis Lindgr., Berl. Ent. Zeitschr., lII, pp. 98, 99 (1908).

Includes *Furcaspis (Aspidiotus) biformis* (Ckll.) and *F. (Aspidiotus) capensis* (Walk.).

Furcaspis oceanica Lindinger.

Aspidiotus biformis Lindgr., Ber. Stat. f. Pflanzensch., vi, p. 44 (1904). In part.
Furcaspis oceanica Lindgr., Zeitschr. f. wiss. Insektenbiol., v, 5, p. 149 (1909). Fig.
in Nos. 7 and 8.
Habitat—Jaluit Islands in Marshall group.
On fruit hulls of cocoanut.

Chrysomphalus barbusano Lindinger.

- Chrysomphalus barbusano* Lindgr., Berl. Ent. Zeitschr., LII, p. 101 (1908).
 Lindgr., Ber. Stat. f. Pflanzensch. Hamb., p. 8 (1908).
 Lindgr., Zeitschr. f. wiss. Insektenbiol., v, 4, p. 105 (1909).
 Fig.
 Habitat—Teneriffe, Canary Islands.
 On *Phæbe barbusano*.

Chrysomphalus minutus Kotinsky.

- Chrysomphalus minutus* Kotinsky, Pr. Haw. Ent. Soc., I, pt. 5, pp. 170–171 (1908). Fig.
 Habitat—Singapore.
 On leaf of undetermined plant.

Chrysomphalus propsimus Banks.

- Chrysomphalus propsimus* Banks, Philippine Jn. Sci., I, 3, pp. 221, 230 (1906). Fig.
 Habitat—Philippines.
 On leaves of *Cocos nucifera*.

Chrysomphalus taxus (Leonardi).

- Aonidiella aurantii* (Mask.) Berl. & Leon., Cherm. Ital., Fasc. I, no. 23 (1895).
taxus Leon., Redia, III, p. 1 (1906). Fig.
 Leon., Bol. Zool. Sc. Sup. Portici, p. 131 (1907). Fig.
 Habitat—Italy.
 On *Taxus baccata*.

Chrysomphalus triglandulosus Green.

- Aspidiotus (Chrysomphalus) triglandulosus* Green, Mem. Dep. Ag. India, II, 2, p. 33
 (1908). Fig.
 Mem. Dep. Ag. India, II, 7, p. 134
 (1908).
 Habitat—Bombay.
 On leaves of undetermined tree.

Targionia alni Marchal.

- Targionia alni* Marchal, Compt. Rend. Ac. Sci., Paris, CXLIII, 13, p. 872 (1909).
 Habitat—France.
 On *Alnus glutinosa*.

Targionia chenopodii Marlatt.

- Aspidiotus (Targionia) chenopodii* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 24
 (1908). Fig.
 Habitat—Coolabah, New South Wales.
 On *Chenopodium*.

Targionia vitis suberi Leonardi.

- Targionia vitis* var. *suberi* Leon., Bol. Lab. Zool. Sc. Sup. Portici, p. 166 (1907). Fig.
 Habitat—Sardinia.
 On *Quercus suber*.

Odonaspis graminis Bremner.

- Odonaspis graminis* Bremner, Can. Ent., XXXIX, p. 368 (1907). Fig.
 Habitat—California.
 On roots of grass.

Odonaspis ruthæ Ehrhorn.

Odonaspis ruthæ Ehrh. (sine descr.), 2d Bien. Rep. Com. Hort. Cal., p. 26 (1907).
Habitat—Hawaii; California (at quarantine).
On grass.

Pseudoparlatoria chilina Lindinger.

Pseudoparlatoria chilina Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. — (1908).
Habitat—Chile.
On *Saxegothæa conspicua*.

Aonidia glandulosa Newstead.

Aonidia glandulosa Newst., Draper (sine descr.), Scale Ins. of Egypt, p. 11 (1907).
Habitat—Egypt.
On "sunt" tree (*Acacia arabica* var. *nilotica*).

Aonidia juniperi Marlatt.

Aonidia juniperi Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 24 (1908). Fig.
Habitat—Utah.
On *Juniperus* sp.

Aonidia perplexa Green.

Aonidia perplexa Green, Jn. Bomb. N. H. Soc., xiii, p. 252 (1902). Fig.
Lindgr., Zeitschr. f. wiss. Insektenbiol., v, 4, p. 109 (1909).
Habitat—Ceylon.
On leaves of *Mesua ferrea*.

Aonidia picea Leonardi.

Aonidia picea Leon., Redia, iii, p. 6 (1906). Fig.
Habitat—Spain.
On *Billartia officinalis*.

Aonidia pinicola Leonardi.

Aonidia pinicola Leon., Annali di Agr., vi, p. 3 (1906). Fig.
Habitat—Spain.
On *Pinus sylvestris*.

Gymnaspis clusiae Lindinger.

Gymnaspis clusiae Lindgr., Deutsche Ent. Zeitschr., I, p. 153 (1909). Fig.
Habitat—Jamaica.
On leaves of *Clusia* sp.

Lepidosaphes auriculata (Green).

Mytilaspis auriculata Green, Tr. Linn. Soc. Lond., xii, pt. 2, p. 205 (1907). Fig.
Habitat—Seychelles.
On "croton."

Lepidosaphes beckii oleæ Leonardi.

Lepidosaphes beckii var. *oleæ* Leon., Bol. Zool. Sc. Sup. Portici, iii, p. 193 (1908). Fig.
Habitat—Sardinia.
On roots of olive.

Lepidosaphes beyeriæ (Green).

Mytilaspis beyeriæ "Green" French (sine descr.), Victorian Nat., xxiii, p. 184 (1907).
Habitat—Victoria, Australia.

Lepidosaphes bicolor Newstead.

- Mytilaspis (Lepidosaphes) bicolor* Newst. (sine descr.), Liverpool Univ. Quart. Jn., 1, 2, pp. 71, 72 (1906).
Newst. (sine descr.), Scale Insects of Egypt, p. 15 (1907).

Habitat—Egypt.

“On an unknown plant.”

Lepidosaphes chilopsidis (Marlatt).

- Mytilaspis chilopsidis* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 27 (1908). Fig.
Habitat—Mexico.
On *Chilopsis linearis*.

Lepidosaphes destefanii Leonardi.

- Lepidosaphes destefanii* Leon., Bol. Zool. Sc. Sup. Portici, 1, p. 167 (1907). Fig.
Habitat—Italy.
On *Phillyrea media*.

Lepidosaphes ficifoliæ ulmicola Leonardi.

- Lepidosaphes ficifoliæ* var. *ulmicola* Leon., Bol. Zool. Sc. Sup. Portici, 1, p. 168 (1907).
Fig.
Habitat—Italy.
On leaves of *Ulmus*.

Lepidosaphes longula Leonardi.

- Lepidosaphes longula* Leon., Annali di Agr., VII, p. 20 (1907). Fig.
Habitat—Java.
On leaves of *Persea* sp.

Lepidosaphes mcgregori Banks.

- Lepidosaphes mcgregori* Banks, Philippine Jn. Sci., 1, 3, pp. 222, 233 (1906). Fig.
Habitat—Philippines.
On leaves of *Cocos nucifera*.

Lepidosaphes ocellata (Green).

- Mytilaspis ocellata* Green, Tr. Linn. Soc. Lond., XII, pt. 2, p. 206 (1907). Fig.
Habitat—Seychelles.
On fronds of *Davallia* sp.

Lepidosaphes piperis (Green).

- Mytilaspis piperis* Green, Mem. Dep. Ag. India, II, 2, p. 34 (1908). Fig.
Habitat—Madras, India.
On young stems of *Piper nigrum*.

^a **Lepidosaphes serrifrons** (Leonardi).

- Mytilaspis serrifrons* Leon., Riv. Pat. Veg., VI, pp. 118 (276), 121 (279) (1897). Fig.
Ckll., Bul. Ill. St. Lab. N. H., v, Art. XII, p. 397 (1899).
Leon., Annali di Agr., v, pp. 45, 48 (1903). Fig.
Habitat—Italy.
On *Croton undulatum* and *C. majesticum*.

^a This species apparently has been omitted in the Fernald catalogue and the writer's first supplementary catalogue (1906).

Lepidosaphes unicolor Banks.

- Lepidosaphes unicolor* Banks, Philippine Jn. Sci., 1, 3, pp. 222, 234 (1906). Fig.
Habitat—Philippines.
On leaves of *Cocos nucifera*.

Parlatoria chinensis Marlatt.

- Parlatoria chinensis* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 30 (1908). Fig.
Habitat—China; Japan; Egypt.
On crab-apple; Hibiscus; Xanthoxylon; *Thuja orientalis*.

Parlatoria cinerea Doane & Hadden.

- Parlatoria cinerea* Doane & Hadden, Can. Ent., XII, p. 299 (1909). Fig.
Habitat—Society Islands.
On bark of orange tree and on cultivated vine.

Parlatoria greeni Banks.

- Parlatoria greeni* Banks, Philippine Jn. Sci., 1, 3, pp. 222, 231 (1906). Fig.
Habitat—Philippines.
On leaves of *Cocos nucifera*.

Parlatoria mangiferæ Marlatt.

- Parlatoria mangiferæ* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 28 (1908). Fig.
Is a synonym of *P. pseudaspidiotus* Lindgr., Insekten Börse, xxii, 33, p. 131 (1905).

Parlatoria pyri Marlatt.

- Parlatoria pyri* Marlatt, Bul. U. S. Bur. Ent., t. s. 16, Pt. II, p. 29 (1908). Fig.
Habitat—China; Manchuria.
On apple; pear.

CORRECTIONS TO CATALOGUE I (1906).

- Page 2. *Icerya colimensis* Ckll., Mem. Soc. Cient. Ant. Alz., xviii, p. 81 (1902).
Icerya tonilensis Ckll., Mem. Soc. Cient. Ant. Alz., xviii, p. 80 (1902).
Icerya rileyi larreæ Ckll., Mem. Soc. Cient. Ant. Alz., xviii, p. 82 (1902).
Page 4. *Trionymus hordei* (Lindeman).
Page 5. *Pseudococcus elongatus* Reuter, corrected in Catalogue II, p. 40.
Page 10. *Chionaspis angusta* Green for *Ch. angustata*.
Page 14. *Aspidiotus riveræ* Ckll., Ent. News, xvi, p. 161 (1905).
Page 15. *Chrysomphalus malleolus* Green=*Pseudaonidia malleolus* (Green).
Page 16. *Fernaldella* for *Fernaldiella*.

Attention should be called to the fact that *Fernaldella* Leonardi is preoccupied in Lepidoptera.

ABBREVIATIONS OF LITERATURE.

- Allg. Zeits. f. Ent.—Allgemeine Zeitschrift für Entomologie.
- Agr. News West. Ind.—Agricultural News. West Indies.
- An. Soc. Cient. Argentina.—Anales de la Sociedad Científica Argentina.
- Ann. Soc. Ent. France.—Annales de la Société Entomologique de France.
- Annali di Agr.—Annali di Agricoltura. Portici.
- Ann. Mag. N. H.—Annals and Magazine of Natural History.
- Ann. Mus. Zool. Ac. Imp. Sc. St. Petersbourg.—Annuaire Musée Zoologique Académie Impériale des Sciences de St. Petersbourg.
- Berl. Ent. Zeitschr.—Berliner Entomologische Zeitschrift.
- Ber. Stat. f. Pflanzensch. Hamb.—Bericht der Station für Pflanzenschutz, Hamburg.
- Bol. Min. Ag.—Boletín del Ministerio de Agricultura. Argentina.
- Bol. Zool. Sc. Sup. Portici.—Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola Superiore d' Agricoltura di Portici.
- Bot. Jahrb.—Botanische Jahrbücher.
- Bul. Ag. Exp. Sta. Japan.—Bulletin of the Imperial Central Agricultural Experiment Station. Japan.
- Bul. Ill. St. Lab. N. H.—Bulletin of the Illinois State Laboratory of Natural History.
- Bul. Soc. Ent. Fr.—Bulletin de la Société Entomologique de France.
- Bul. Soc. Ent. Ital.—Bulletino della Società Entomologica Italiana.
- Bul. Soc. Zool. France.—Bulletin de la Société Zoologique de France.
- Bul. U. S. Bur. Ent. t. s. 16, Pt. II.—Bulletin, Technical Series, Bureau of Entomology, U. S. Department of Agriculture.
- Can. Ent.—Canadian Entomologist.
- Catalogue Coccidæ.—U. S. Bur. Ent. technical series, Bul. 12, Pt. I (1906).
- Cherm. Ital.—Chermotheca Italica.
- Compt. Rend. Ac. Sci., Paris.—Comptes rendus hebdomadaires des séances de l'Académie des sciences. Paris.
- Compt. Rend. Soc. Biol.—Comptes rendus des seances de la Société de Biologie. Paris.
- Deutsche Ent. Zeitschr.—Deutsche Entomologische Zeitschrift.
- Ent. Mo. Mag.—The Entomologist's Monthly Magazine.
- Ent. Blätter.—Entomologische Blätter, Internationale Monatsschrift für die Biologie der Käfer Europas. Schwabach.
- Ent. Rec. Jn. Variation.—The Entomologist's Record and Journal of Variation.
- Ent. Wochenblatt.—Entomologisches Wochenblatt (*antea* Insekten-Börse).
- Ind. Mus. Notes.—Indian Museum Notes.
- Insekten Börse.—Entomologische Wochenblatt.
- Jahrb. Hamb. wiss. Anst.—Jahrbuch der Hamburgischen wissenschaftlichen Anstalten.
- Jn. Bomb. N. H. Soc.—Journal of the Bombay Natural History Society. Calcutta.
- Jn. Econ. Biol.—The Journal of Economic Biology.
- Jn. N. Y. Ent. Soc.—Journal of the New York Entomological Society.
- Liverpool Univ. Quart. Jn.—Institute of Commercial Research in the Tropics, Liverpool University, Quarterly Journal.
- Medd. Soc. Faun. Fenn.—Meddelanden af Societas pro Fauna et Flora Fennica.
- Mem. Dep. Ag. India.—Memoirs of the Department of Agriculture in India.
- Mem. Soc. Cient. Ant. Alz.—Memorias y Revista de la Sociedad Científica "Antonio Abzate."
- Mém. Soc. Zool. France.—Mémoires de la Société Zoologique de France.

- Nachrichtsbl. Naturfrsch.-Klubs, Prossnitz.—Nachrichtsblatt Naturforscher-Klubs, Prossnitz (Mähren).
- N. Z. Trans.—Transactions of the New Zealand Institute.
- Pests and Blights of Tea Plant.—The Pests and Blights of the Tea Plant, 2d ed. Watt & Mann, Calcutta, 1903.
- Philippine Jn. Sci.—The Philippine Journal of Science.
- Pomona Jn. Ent.—Pomona Journal of Entomology. Claremont, California.
- Pr. Biol. Soc. Wash.—Proceedings of the Biological Society of Washington.
- Pr. Ent. Soc. Wash.—Proceedings of the Entomological Society of Washington.
- Pr. Haw. Ent. Soc.—Proceedings of the Hawaiian Entomological Society.
- Redia.—Redia.
- Riv. Pat. Veg.—Rivista di Patologia Vegetale.
- Scale Ins. of Egypt.—Notes on the Injurious Scale Insects and Mealy Bugs of Egypt. Cairo, 1907.
- Trab. Mus. Farm. Fac. Cienc. Med.—Trabajos del Museo de farmacologia de la Facultad de Ciencias Medicas. Buenos Aires, Argentina.
- Tr. Linn. Soc. Lond.—Transactions of the Linnæan Society of London.
- Victorian Nat.—The Victorian Naturalist.
- Zeitschr. f. wiss. Insektenbiol.—Zeitschrift für wissenschaftliche Insektenbiologie.

TECHNICAL SERIES, No. 16, PART IV.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

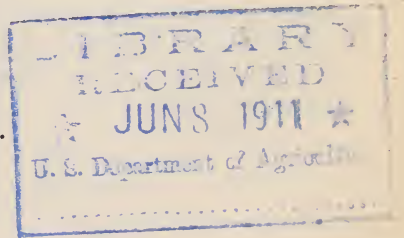
CATALOGUE

OF

RECENTLY DESCRIBED COCCIDÆ—III.

By E. R. SASSCER,
Scientific Assistant.

ISSUED JUNE 8, 1911.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1911.

CONTENTS.

	Page.
Subfamily Monophlebinae.....	61
Subfamily Dactylopiinae.....	62
Subfamily Coccinae.....	66
Subfamily Diaspinae.....	68

PAPERS ON COCCIDÆ OR SCALE INSECTS.

CATALOGUE OF RECENTLY DESCRIBED COCCIDÆ—III.

By E. R. SASSCER, *Scientific Assistant.*

Since the publication, December 22, 1909, of Tech. Ser. 16, Part III, "Catalogue of Recently Described Coccidæ—II," by Mr. J. G. Sanders, 3 new subgenera, 98 new species, and 5 new varieties have been recorded by workers on scale insects. In all, some 23 new genera, 9 new subgenera, 430 new species, and 41 new varieties have been recorded from various quarters of the globe since the publication of Mrs. Fernald's valuable contribution in 1903.

Owing to the large amount of literature relating to entomology which is published daily and to the fact that some entomologists describe species in periodicals which do not relate to insect life, it is the earnest request of the writer that all workers on Coccidæ send to the Bureau of Entomology separates of their papers and as far as possible any available material. This list is believed to be fairly complete up to March, 1911, and any corrections or omissions are solicited from coworkers.

In examining the voluminous literature the writer was greatly assisted by Miss Mabel Colcord, librarian of the bureau, and he is equally indebted to Prof. T. D. A. Cockerell for his many valuable suggestions.

All species marked with an asterisk are represented in the National Collection of Coccidæ.

Subfamily **MONOPHLEBINÆ.****Monophlebus sjöstedti** Newstead.

Monophlebus sjöstedti Newst., Kilimandjaro-Meru Exp., 12 (1 Coccidæ), p. 2 (1908).

Fig.

Habitat—Kilimandjaro.

Monophlebus pallidus Newstead.

Monophlebus pallidus Newst., Kilimandjaro-Meru Exp., 12 (1 Coccidæ), p. 3 (1908).

Fig.

Habitat—Kilimandjaro.

Walkeriana africana Newstead.

Walkeriana africana Newst., Kilimandjaro-Meru Exp., 12 (1 Coccidæ), p. 4 (1908). Fig.

Habitat—Kilimandjaro.

On grass.

Subfamily **DACTYLOPIINÆ**.**Asterolecanium ceriferum** Green.*Asterolecanium ceriferum* Green, Cocc. Ceylon, iv, p. 324 (1909). Fig.

Habitat—Ceylon.

On leaves of palm.

Asterolecanium ceriferum prominens Green.*Asterolecanium ceriferum prominens* Green, Cocc. Ceylon, iv, p. 326 (1909). Fig.

Habitat—Ceylon.

On *Oxytenanthera thwaitesii*.**Asterolecanium coronatum** Green.* *Asterolecanium coronatum* Green, Cocc. Ceylon, iv, p. 327 (1909). Fig.

Habitat—Ceylon.

On *Dendrocalamus giganteus* and *Gigantochloa aspera*.**Asterolecanium exiguum** Green.*Asterolecanium exiguum* Green, Cocc. Ceylon, iv, p. 315 (1909). Fig.

Habitat—Ceylon.

On under surface of leaves of bamboo.

Asterolecanium flavociliatum Green.*Asterolecanium flavociliatum* Green, Cocc. Ceylon, iv, p. 322 (1909). Fig.

Habitat—Ceylon.

On *Arundinaria* sp.**Asterolecanium lanceolatum** Green.*Planchonia miliaris longa* Green (part), Ind. Mus. Notes, iv, p. 5 (1896).¹ *Asterolecanium lineare* Green, Cocc. Ceylon, iv, p. 336 (1909). Fig.*lanceolatum* Green, Cocc. Ceylon, iv, preface (1909).

Habitat—Ceylon.

On leaves of *Arundinaria* sp.**Asterolecanium pasanix** Kuwana and Cockerell.*Asterolecanium pasanix* Kuwana and Ckll., Jn. N. Y. Ent. Soc., xvii, 4, p. 152 (1909).

Fig.

Habitat—Japan.

On *Pasania cuspidata*.**Asterolecanium pudibundum** Green.*Asterolecanium pudibundum* Green, Cocc. Ceylon, iv, p. 323 (1909). Fig.

Habitat—Ceylon.

On *Arundinaria* sp.**Asterolecanium pustulans seychellarum** Green.*Asterolecanium pustulans seychellarum* Green, Jn. Econ. Biol., v, 1, p. 3 (1910). Fig.

Habitat—Seychelles Islands.

On *Hevea brasiliensis*.

¹ *A. lineare* was first proposed for this species, but was subsequently changed by the author to *A. lanceolatum*, since the former was preoccupied by a species described by Lindinger on coconut palms from Brazil.

Asterolecanium rubrocomatum Green.

- **Asterolecanium rubrocomatum* Green, Cocc. Ceylon, iv, p. 316 (1909). Fig.
Habitat—Ceylon.
On upper surface of leaves of *Bambusa* sp.

Asterolecanium tenuissimum Green.

- Asterolecanium tenuissimum* Green, Cocc. Ceylon, iv, p. 318 (1909). Fig.
Habitat—Ceylon.
On bamboo, both surfaces of leaves.

Asterolecanium thespesiæ Green.

- **Asterolecanium thespesiæ* Green, Cocc. Ceylon, iv, p. 331 (1909). Fig.
Habitat—Ceylon.
On *Thespesia populnea*.

Asterolecanium tumidum Green.

- Asterolecanium tumidum* Green, Cocc. Ceylon, iv, p. 330 (1909). Fig.
Habitat—Ceylon.
On leaves of bamboo.

Asterolecanium udagamæ Green.

- Asterolecanium udagamæ* Green, Cocc. Ceylon, iv, p. 319 (1909). Fig.
Habitat—Ceylon.
On leaf of bamboo.

Asterolecanium variolosum minor Leonardi.

- Asterolecanium variolosum minor* Leonardi (sine descr.), Cherm. Ital., v, No. 107 (1909).
Habitat—Italy.
On *Quercus* sp.

Lecaniodiaspis azadirachtæ Green.

- Lecaniodiaspis azadirachtæ* Green, Cocc. Ceylon, iv, p. 298 (1909). Fig.
Habitat—Ceylon.
On "margosa" (*Azadirachta indica*).

Lecaniodiaspis malaboda Green.

- **Lecaniodiaspis malaboda* Green, Cocc. Ceylon, iv, p. 300 (1909). Fig.
Habitat—Ceylon.
On "malaboda" (*Myristica laurifolia*) and *Bocagea obliqua*.

Cerococcus albospicatus Green.

- **Cerococcus albospicatus* Green, Cocc. Ceylon, iv, p. 308 (1909). Fig.
Habitat—Ceylon.
On bark of *Symplocos obtusa*.

Cerococcus indicus Green.

- Cerococcus indicus* Green, Jn. Econ. Biol., v, 1, p. 5 (1910). Fig.
Habitat—India.
On *Helicteres isora*.

Cerococcus ornatus Green.

- Cerococcus ornatus* Green, Cocc. Ceylon, iv, p. 306 (1909). Fig.
Habitat—Ceylon.
On *Coffea arabica* and *Carissa* sp.

Cerococcus roseus Green.

**Cerococcus roseus* Green, Cocc. Ceylon, iv, p. 310 (1909). Fig.

Habitat—Ceylon.

On undetermined tree.

Stictococcus dimorphus Newstead.

Stictococcus dimorphus Newst., Bul. Ent. Res., i, i, p. 63 (1910). Fig.

Habitat—German East Africa.

On cacao pods.

Stictococcus formicarius Newstead.

Stictococcus formicarius Newst., Jn. Econ. Biol., v, 1, p. 19 (1910). Fig.

Habitat—Upper Congo, Africa.

In hollow stems of *Barteria fistulosa* and *Cuviera angolensis* attended by *Sima spininoda* André.

Phenacoccus oleæ Marchal.

Phenacoccus oleæ Marchal, Bul. Soc. Ent. Fr., No. 13, p. 244 (1910).

Habitat—Tunisie.

On olive attended by a *Cremastogaster*.

Ceroputo ambigua Fullaway.

Ceroputo ambigua Fullaway, Pr. Haw. Ent. Soc., ii, 2, p. 73 (1909).

Fullaway, Pr. Dav. Acad. Sci., xii, p. 223 (1910). Fig.

Habitat—California.

On pickle weed (*Salicornia ambigua*).

Pseudococcus ananassæ Kuwana.

Dactylopius (Pseudococcus) ananassæ Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 162 (1909). Fig.

Habitat—Japan.

On pineapple.

Pseudococcus bakeri Essig.

Pseudococcus bakeri Essig, Pom. College Jn. Ent., ii, 4, p. 334 (1909). Fig.

Habitat—California.

On elder (*Sambucus glauca*); walnut (*Juglans regia*); apple (*Pyrus malus*); pear (*Pyrus communis*).

Pseudococcus boninsis Kuwana.

Dactylopius (Pseudococcus) boninsis Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 161 (1909). Fig.

Habitat—Japan.

On sugar cane.

Pseudococcus coccineus Newstead.

Dactylopius coccineus Newst., Kilimandjaro-Meru Exp., 12 (1 Coccidæ), p. 8 (1908).

Fig.

Habitat—Kilimandjaro.

On *Acacia*.

Pseudococcus missionum Cockerell.

Pseudococcus missionum Ckll., The Entom., xlii, 563, p. 113 (1910).

Habitat—Argentina.

On —?

Pseudococcus perniciosus Newstead and Willcocks.

Dactylopius perniciosus Newstead and Willcocks, Bul. Ent. Res., I, 2 (Appendix 1), pp. 133-140, July, 1910. Fig.

Willcocks, Bul. Ent. Res., I, 2, pp. 121-137, July, 1910. Fig.

Hughes, Bul. Ent. Res., I, 2, Appendix II, p. 141, July, 1910.

Habitat—Egypt.

On lebbek (*Albizzia lebbek*); cotton (*Gossypium* sp.); Christ's thorn (*Zizyphus spinachristi*); sunt tree (*Acacia arabica*).

Ripersia anomala Newstead.

Ripersia anomala Newst., Kilimandjaro-Meru Exp., 12 (1 Coccidæ), p. 9 (1908). Fig.

Habitat—Kilimandjaro.

Under bark accompanied by *Pheidole megacephala*.

Ripersia agasawarensis Kuwana.

Ripersia agasawarensis Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 161 (1909). Fig.

Habitat—Japan.

On *Miscanthus* sp.

Ripersia smithii Essig.

Ripersia smithii Essig, Pom. College Jn. Ent., II, 2, p. 218 (1910). Fig.

Habitat—California.

On wild rye (*Elymus condensatus*).

Ripersiella rhizophilla Fullaway and Kotinsky.

¹ *Ripersiella rhizophilla* Fullaway and Kotinsky (sine descr.), Ent. News, XXI, 1, p. 49 (1910).

Pollinia ceylonica Green.

Pollinia ceylonica Green, Cocc. Ceylon, IV, p. 341 (1909). Fig.

Habitat—Ceylon.

On under surface of undetermined trees in dense jungle.

Ceroplastidia Cockerell, n. subg. of *Ceroplastes*. Type, *bruneri* Ckll.

Cockerell, Can. Ent., XLII, 3, p. 76 (1910).

Ceroplastina Cockerell, n. subg. of *Ceroplastes*. Type, *lahillei* Ckll.

Cockerell, Can. Ent., XLII, 3, p. 76 (1910).

Ceroplastes ficus Newstead.

Ceroplastes ficus Newst., Bul. Ent. Res., I, 3, p. 190 (1910). Fig.

Habitat—German East Africa.

On bark-cloth (*Ficus* sp.).

Ceroplastes lahillei Cockerell.

Ceroplastes (*Ceroplastina*) *lahillei* Ckll., Can. Ent., XLII, 3, p. 74 (1910). Fig.

Habitat—Argentina.

Ceroplastes quadrilineatus Newstead.

Ceroplastes quadrilineatus Newstead, Bul. Ent. Res., I, 3, p. 193 (1910). Fig.

Habitat—British East Africa.

On *Anona muricata*; bark-cloth (*Ficus* sp.).

¹ Reduced to synonym of *Geococcus radicum* Green by David T. Fullaway, Pr. Haw. Ent. Soc., II, 3, p. 108 (1910).

Ceroplastes singularis Newstead.

- Ceroplastes singularis* Newstead, Bul. Ent. Res., i, 3, p. 188 (1910). Fig.
Habitat—British East Africa.
On guava (*Psidium guava*).

Ceroplastodes chiton Green.

- Ceroplastodes chiton* Green (sine descr.), Mem. Dep. Ag. India, II, 2, p. 32 (1908).
Sanders, Catalogue Coccidæ—II, p. 45 (1909).
Green, Cocc. Ceylon, IV, p. 287 (1909). Fig.
Habitat—India and Ceylon.
On *Cajanus indicus* and *Cassia* sp.

Ceroplastodes virescens Green.

- Ceroplastodes virescens* Green, Cocc. Ceylon, IV, p. 288 (1909). Fig.
Habitat—Ceylon.
On terminal shoots of *Theobroma cacao*.

Subfamily **COCCINÆ**.**Ceronema koebeli** Green.

- **Ceronema koebeli* Green, Cocc. Ceylon, IV, p. 256 (1909). Fig.
Habitat—Ceylon.
On *Sapium sebiferum*.

Pulvinaria cellulosa Green.

- **Pulvinaria cellulosa* Green, Cocc. Ceylon, IV, p. 262 (1909). Fig.
Habitat—Ceylon.
On *Citrus* sp.

Pulvinaria ixoræ Green.

- Pulvinaria ixoræ* Green, Cocc. Ceylon, IV, p. 266 (1909). Fig.
Habitat—Ceylon.
On *Ixora coccinea*.

Pulvinaria occidentalis subalpina Cockerell.

- **Pulvinaria occidentalis subalpina* Ckll., Jn. Econ. Ent., III, 5, p. 428 (1910).
Habitat—Colorado.
On *Betula glandulosa*.

Pulvinaria thespesiæ Green.

- **Pulvinaria thespesiæ* Green, Cocc. Ceylon, IV, p. 259 (1909). Fig.
Habitat—Ceylon.
On "suriya" (*Thespesia populnea*).

Protopulvinaria longivalvata Green.

- Protopulvinaria longivalvata* Green, Cocc. Ceylon, IV, p. 254 (1909). Fig.
Habitat—Ceylon.
On leaves of *Piper nigrum*.

Coccus celtium Kuwana.

- Lecanium (Coccus) celtium* Kuwana, Jn. N. Y. Ent. Soc., XVII, 4, p. 162 (1909). Fig.
Habitat—Japan.
On *Celtis sinensis*.

Coccus fukayai Kuwana.

Lecanium (Coccus) fukayai Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 154 (1909). Fig.
Habitat—Japan.
On vine.

Coccus muiri Kotinsky.

¹ *Coccus tuberculatus* Kotinsky, Pr. Haw. Ent. Soc., i, 5, p. 168 (1908). Fig.
Sanders, Catalogue Coccidæ—II, p. 45 (1909).
Coccus muiri Kotinsky, Pr. Haw. Ent. Soc., ii, 2, p. 37 (1909).
Habitat—Singapore.
On leaves of unknown tree.

Coccus ochraceæ Kuwana.

Lecanium (Coccus) ochraceæ Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 154 (1909). Fig.
Habitat—Japan.
On *Eurya ochracea*.

Hemilecanium recurvatum Newstead.

Hemilecanium recurvatum Newst., Jn. Econ. Biol., v, 1, p. 18 (1910). Fig.
Habitat—Upper Congo, Africa.
In hollow stems of *Plectronia laurentii* DeWild attended by *Cremastogaster*.

Neolecanium crustuliforme Green.

Neolecanium crustuliforme Green, Cocc. Ceylon, iv, p. 252 (1909). Fig.
Habitat—Ceylon.
On small branches of undetermined tree.

Lecanium mori var. **somereni** Newstead.

Lecanium mori var. *somereni* Newst., Bul. Ent. Res., i, 3, p. 187 (1910).
Habitat—British East Africa.
On *Morus* sp.

Lecanium resinatum Kieffer and Herbst.

Lecanium resinatum Kieffer and Herbst, Centr. f. Bakt. Par. u. Infekt., zweite
Abt., xxiii, 1-5, p. 122 (1909).
Habitat—Chile.
On *Baccharis rosmarinifolia*.

Saissetia pseudonigrum Kuwana.

Lecanium (Saissetia) pseudonigrum Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 162
(1909). Fig.
Habitat—Japan.
On "shirotsugi."

Saissetia sideroxylium Kuwana.

Lecanium (Saissetia) sideroxylium Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 162 (1909).
Fig.
Habitat—Japan.
On *Sideroxylon ferrugineum*.

Aclerda distorta Green.

* *Aclerda distorta* Green, Cocc. Ceylon, iv, p. 290 (1909). Fig.
Habitat—Ceylon.
Beneath the ensheathing bases of leaves of *Arundinaria* sp.

¹ Specific name preoccupied.

Takahashia citricola Kuwana.

Takahashia citricola Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 153 (1909). Fig.
Habitat—Japan.
On *Citrus* sp.

Lichtensia japonica Kuwana.

Lichtensia japonica Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 152 (1909). Fig.
Habitat—Japan.
On *Thea japonica*.

Inglisia chelonioides Green.

Inglisia chelonioides Green, Cocc. Ceylon, iv, p. 283 (1909). Fig.
Habitat—Ceylon.
On *Gelonium lanceolatum*.

Inglisia conchiformis Newstead.

Inglisia conchiformis Newst., Bul. Ent. Res., i, 3, p. 185 (1910). Fig.
Habitat—West Africa and British East Africa.
On *Averrhoa carambola* and *Harogana madagascariensis*.

Subfamily **DIASPINÆ**.**Chionaspis dentilobis** Newstead.

Chionaspis dentilobis Newst., Bul. Ent. Res., i, 3, p. 195 (1910). Fig.
Habitat—British East Africa.
“On —?”

Chionaspis kinshinensis Kuwana.

Chionaspis kinshinensis Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 155 (1909). Fig.
Habitat—Japan.
On *Quercus* sp.

Chionaspis sassceri Cockerell and Robbins.

* *Chionaspis sassceri* Ckll. and Robb., Jn. N. Y. Ent. Soc., xvii, 3, p. 105 (1909). Fig.
Habitat—California.
On orange.

Chionaspis substriata Newstead.

Chionaspis substriata Newst., Bul. Ent. Res., i, 3, p. 197 (1910). Fig.
Habitat—British East Africa.
On palms.

Diaspis africana Lindinger.

Diaspis africana Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 22 (1909). Fig.
Habitat—South Africa.
On leaves of *Connarum smeathmanni* and *Syzygium guineense*.

Diaspis (?) chionaspiformis Newstead.

Diaspis (?) chionaspiformis Newst., Bul. Ent. Res., i, 3, p. 198 (1910). Fig.
Habitat—British East Africa.
On an unknown plant.

Diaspis pugionifera Lindinger.

Diaspis pugionifera Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 24 (1909). Fig.
Habitat—South Africa.
On leaves of *Mitragyne macrophylla*.

Diaspis stilosa Lindinger.

Diaspis stilosa Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 25 (1909). Fig.
Habitat—South Africa.
On leaves of *Strychnos cinnabarina*.

Leucaspis indiæ-orientalis Lindinger.

¹ *Leucodiaspis indiæ-orientalis* Lindgr. (sine descr.), Zeitschr. f. wiss. Insektenbiol., vi, 11, p. 373 (1910).
Habitat—India.
On *Pinus* sp.

Cryptodiaspis Lindinger, n. subg. of *Diaspis*. Type, *conservans*.
Lindinger, Jahrb. Hamb. wiss. Anst., xxvi, p. 26 (1909).

Diaspis conservans Lindinger.

Diaspis (*Cryptodiaspis*) *conservans* Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 26 (1909). Fig.
Habitat—South America.
On leaves of Euphorbiaceæ.

Diaspis hamata Lindinger.

Diaspis (*Cryptodiaspis*) *hamata* Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 28 (1909). Fig.
Habitat—South Africa.
On leaves of *Macrolobium zenkeri*.

Diaspis limuloides Lindinger.

Diaspis (*Cryptodiaspis*) *limuloides* Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 30 (1909). Fig.
Habitat—South Africa.
On leaves of *Cynometra* sp. with *Aonidia biafra* Lindgr.

Aspidiotus arctostaphyli Cockerell and Robbins.

Aspidiotus arctostaphyli Ckll. and Robb., Jn. N. Y. Ent. Soc., xvii, 3, p. 104 (1909). Fig.
Habitat—California.
On leaves of *Arctostaphylos viscida*.

Aspidiotus fissidens Lindinger.

Aspidiotus fissidens Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 14 (1909). Fig.
Habitat—South Africa.
On leaves of *Parinari* *gabunense* and *Strychnos cinnabarina*.

Aspidiotus mæandrius Lindinger.

Aspidiotus mæandrius Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 15 (1909). Fig.
Habitat—South Africa.
On leaf of *Dichapetalum* sp.

Aspidiotus mori Herrick.

* *Aspidiotus* (*Diaspidiotus*) *mori* Herrick, Ent. News, xxi, 1, p. 22 (1910). Fig.
Habitat—Texas.
On *Morus rubra*.

¹ *Leucodiaspis* is not valid. See Bul. U. S. Bur. Ent., Tech. Ser. 16, Pt. II, p. 50 (1909).

Aspidiotus pectinatus Lindinger.

Aspidiotus pectinatus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 43 (1909). Fig.
Habitat—South Africa.
On pear.

Aspidiotus replicatus Lindinger.

Aspidiotus replicatus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 17 (1909). Fig.
Habitat—South Africa.
On leaves of *Ehretia cymosa*, *Illigera pentophylla*, *Mitragyne macrophylla*, and
Anacardiaceæ.

Aspidiotus seurati Marchal.

Aspidiotus (Hemiberlesia) seurati Marchal, Bul. Soc. Ent. Fr., p. 71 (1911).
Habitat—South Algeria.
On *Zilla macroptera*.

Aspidiotus spiniger Lindinger.

Aspidiotus spiniger Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 19 (1909). Fig.
Habitat—South Africa.
On leaf of *Strombosiopsis tetranda*.

Aspidiotus undulatus Lindinger.

Aspidiotus undulatus Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 20 (1909). Fig.
Habitat—South Africa.
On leaves of *Acioa pallescens* and *Strychnos cinnabarina*.

Aonidia biafræ Lindinger.

Aonidia biafræ Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 40 (1909). Fig.
Habitat—South Africa.
On leaves of *Schotia humboldtioides*, *Crudia zenkeri*, and *Cynometra* sp.

Aonidia dentata Lindinger.

Aonidia dentata Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 1, p. 12 (1911). Fig.
Habitat—India.
On leaf of *Walsura piscidis*.

Aonidia spinosissima Lindinger.

Aonidia spinosissima Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, p. 12 (1911). Fig.
Habitat—Central India.
On *Mimusops hexandra*.

Gymnaspis aberemoæ Lindinger.

Gymnaspis aberemoæ Lindgr., Deutsche Ent. Zeitschr., iv, p. 437 (1910). Fig.
Habitat—Brazil.
On *Aberemoa rhizantha*.

Chrysomphalus portoricensis Lindinger.

Chrysomphalus (Melanaspis) portoricensis Lindgr., Zeitschr. f. wiss. Insektenbiol.,
vi, 12, p. 441 (1910). Fig.
Habitat—Venezuela.
On leaf of *Bletia* sp.

Targionia celtis Herrick.

- ¹*Targionia celtis* Herrick, Can. Ent., XLIII, 11, p. 373 (1910). Fig.
Habitat—Texas.
On *Celtis occidentalis*.

Targionia vitis arbutus Leonardi.

- Targionia vitis arbutus* Leon. (sine descr.), Cherm. Ital., v, p. 123 (1909).
Habitat—Italy.
On *Arbutus unedo*.

Pseudoparlatoria cristata Lindinger.

- Pseudoparlatoria cristata* Lindgr., Zeitschr. f. wiss. Insektenbiol., VII, p. 10 (1911).
Fig.
Habitat—Brazil.
On leaf of *Gnetum leyboldi*.

Cryptaspidiotus mediterraneus Lindinger.

- Cryptaspidiotus mediterraneus* Lindgr. (sine descr.), Zeitschr. f. wiss. Insektenbiol.,
VI, 11, p. 373 (1910).
Lindgr., Zeitschr. f. wiss. Insektenbiol., VI, 12, p. 437
(1910). Fig.
Habitat—Algeria.
On leaves of *Juniperus phœnicea* and *Callitris quadrivalvis*.

Ischnaspis bipindensis Lindinger.

- Ischnaspis bipindensis* Lindgr., Jahrb. Hamb. wiss. Anst., XXVI, p. 32 (1909). Fig.
Habitat—South Africa
On leaves of *Cyclostemon bipindensis* and *Strychnos cinnabarina*.

Lepidosaphes aberrans Lindinger.

- Lepidosaphes aberrans* Lindgr., Jahrb. Hamb. wiss. Anst., XXVI, p. 33 (1909). Fig.
Habitat—South Africa.
On leaf of *Cynometra* sp.

Lepidosaphes arii Kuwana.

- Mytilaspis* (*Lepidosaphes*) *ariii* Kuwana, Jn. N. Y. Ent. Soc., XVII, 4, p. 163 (1909).
Fig.
Habitat—Japan.
On *Miscanthus* sp.

Lepidosaphes buzenensis Kuwana.

- Mytilaspis* (*Lepidosaphes*) *buzenensis* Kuwana, Jn. N. Y. Ent. Soc., XVII, 4, p. 155
(1909). Fig.
Habitat—Japan.
On vine.

Lepidosaphes chitinosus Lindinger.

- Lepidosaphes* (*Coccomytilus*) *chitinosus* Lindgr., Jahrb. Hamb. wiss. Anst., XXVI,
p. 34 (1909). Fig.
Habitat—South Africa.
On *Berlinia*.

¹ Not a valid species; synonym of *Targionia cueroensis* (Ckll.).

Lepidosaphes crudix Lindinger.

Lepidosaphes crudix Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 35 (1909). Fig.
Habitat—South Africa.
On leaf of *Crudia zenkeri*.

Lepidosaphes kamerunensis Lindinger.

Lepidosaphes kamerunensis Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 37 (1909).
Fig.
Habitat—South Africa.
On leaves of *Loranthus* sp.

Lepidosaphes meridionalis Lindinger.

Lepidosaphes meridionalis Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 38 (1909).
Fig.
Habitat—South Africa.
On *Macrolobium palisoti*.

Lepidosaphes tenuior Lindinger.

Lepidosaphes tenuior Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, p. 40 (1909). Fig.
Habitat—South Africa.
On leaf of *Cynometra* sp.

Lepidosaphes uniloba Kuwana.

Mytilaspis (Lepidosaphes) uniloba Kuwana, Jn. N. Y. Ent. Soc., xvii, 4, p. 156 (1909).
Fig.
Habitat—Japan.
On *Osmanthus*.

Parlatoria hastata Lindinger.

Parlatoria hastata Lindgr. (sine descr.), Zeitschr. f. wiss. Insektenbiol., vi, 11, p. 375
(1910).
Habitat—Not given.

CORRECTIONS TO CATALOGUE II—1909.

Page 38, instead of lines 9 and 10 under "**Stictococcus multispinosus** Newstead,"
read:

Stictococcus multispinosus Newst., Kilimandjaro-Meru Exp., 12 (1 Coccidæ), p. 6 (1908). Fig.
Newst., Jn. Econ. Biol., ii, 4, p. 150, footnote (1908).
Habitat—Kilimandjaro, East Africa.

Page 38, line 12 from bottom, for **CXLIII** read **CXLVIII**.

Page 46, line 15, for **Lecanium ceconi** Leonardi read **Lecanium ceconi** (Leonardi).

Page 46, line 19, for **Lecanium glandi** (Kuwana) read **Lecanium glandi** Kuwana.

Page 46, line 24, for **Lecanium kunoensis** (Kuwana) read **Lecanium kunoensis**
Kuwana.

Page 46, line 13 from bottom. *Lecanium rubellum* Lindinger on *Calluna vulgaris*,
given as a synonym of *Lecanium pulchrum* Marchal, has been resurrected as a valid
species by Mr. J. G. Sanders.

Page 47, line 18. *Hemilecanium theobromæ* Newstead = *Hemilecanium imbricans* Green,
on the authority of Green.

Page 55, line 16, for **CXLIII** read **CXLVIII**.

ABBREVIATIONS OF LITERATURE.

- Allg. Zeits. f. Ent.—Allgemeine Zeitschrift für Entomologie.
 Agr. News West Ind.—Agricultural News. West Indies.
 An. Soc. Cient. Argentina.—Anales de la Sociedad Científica Argentina.
 Ann. Soc. Ent. France.—Annales de la Société Entomologique de France.
 Annali di Agr.—Annali di Agricoltura. Portici.
 Ann. Mag. N. H.—Annals and Magazine of Natural History.
 Ann. Mus. Zool. Ac. Imp. Sc. St. Petersburg.—Annuaire Musée Zoologique Académie Impériale des Sciences de St. Petersburg.
 Berl. Ent. Zeitschr.—Berliner Entomologische Zeitschrift.
 Ber. Stat. f. Pflanzensch. Hamb.—Bericht der Station für Pflanzenschutz, Hamburg.
 Bol. Min. Ag.—Boletín del Ministerio de Agricultura. Argentina.
 Bol. Zool. Sc. Sup. Portici.—Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola Superiore d' Agricoltura di Portici.
 Bot. Jahrb.—Botanische Jahrbücher.
 Bul. Ag. Exp. Sta. Japan.—Bulletin of the Imperial Central Agricultural Experiment Station. Japan.
 Bul. Ent. Res.—Bulletin of Entomological Research.
 Bul. Ill. St. Lab. N. H.—Bulletin of the Illinois State Laboratory of Natural History.
 Bul. Soc. Ent. Fr.—Bulletin de la Société Entomologique de France.
 Bul. Soc. Ent. Ital.—Bulletino della Società Entomologica Italiana.
 Bul. Soc. Zoo. France.—Bulletin de la Société Zoologique de France.
 Bul. U. S. Bur. Ent., t. s. 16, Pt. II.—Bulletin, Technical Series, Bureau of Entomology, U. S. Department of Agriculture.
 Can. Ent.—Canadian Entomologist.
 Catalogue Coccidæ—I.—U. S. Bur. Ent., technical series, Bul. 12, Pt. I (1906).
 Catalogue Coccidæ—II.—U. S. Bur. Ent., technical series, Bul. 16, Pt. III (1909).
 Centr. f. Bakt. Par. u. Infekt.—Centralblatt für Bakteriologie und Parasitenkunde und Infektionskrankheiten.
 Cherm. Ital.—Chermotheca Italica.
 Cocc. Ceylon.—Coccidæ of Ceylon.
 Compt. Rend. Ac. Sci., Paris.—Comptes rendus hebdomadaires des séances de l'Académie des sciences. Paris.
 Compt. Rend. Soc. Biol.—Comptes rendus des séances de la Société de Biologie. Paris.
 Deutsche Ent. Zeitschr.—Deutsche Entomologische Zeitschrift.
 Ent. Mo. Mag.—The Entomologist's Monthly Magazine.
 Ent. Blätter.—Entomologische Blätter, Internationale Monatsschrift für die Biologie der Käfer Europas. Schwabach.
 Ent. News.—Entomological News.
 Ent. Rec. Jn. Variation.—The Entomologist's Record and Journal of Variation.
 Ent. Wochenblatt.—Entomologisches Wochenblatt (*antea* Insekten-Börse).
 Ind. Mus. Notes.—Indian Museum Notes.
 Insekten Börse.—Entomologische Wochenblatt.
 Jahrb. Hamb. wiss. Anst.—Jahrbuch der Hamburgischen wissenschaftlichen Anstalten.
 Jn. Bomb. N. H. Soc.—Journal of the Bombay Natural History Society. Calcutta.
 Jn. Econ. Biol.—The Journal of Economic Biology.
 Jn. N. Y. Ent. Soc.—Journal of the New York Entomological Society.

- Kilimandjaro-Meru Exp.—Schwedischen Zoologischen Expedition nach Dem Kilimandjaro, Dem Meru und Den Umgebenden Massaisteppen Deutsch-Ostafrikas. Liverpool Univ. Quart. Jn.—Institute of Commercial Research in the Tropics, Liverpool University, Quarterly Journal.
- Medd. Soc. Faun. Fenn.—Meddelanden af Societas pro Fauna et Flora Fennica.
- Mem. Dep. Ag. India.—Memoirs of the Department of Agriculture in India.
- Mem. Soc. Cient. Ant. Alz.—Memorias y Revista de la Sociedad Científica “Antonio Alzate.”
- Mém. Soc. Zool. France.—Mémoires de la Société Zoologique de France.
- Nachrichtsbl. Naturforsch.-Klubs, Prossnitz.—Nachrichtsblatt Naturforscher-Klubs, Prossnitz (Mähren).
- N. Z. Trans.—Transactions of the New Zealand Institute.
- Pests and Blights of Tea Plant.—The Pests and Blights of the Tea Plant, 2d ed. Watt & Mann, Calcutta, 1903.
- Philippine Jn. Sci.—The Philippine Journal of Science.
- Pomona College Jn. Ent.—Pomona College Journal of Entomology. Claremont, California.
- Pr. Biol. Soc. Wash.—Proceedings of the Biological Society of Washington.
- Pr. Dav. Acad. Sci.—Proceedings Davenport Academy of Sciences. Davenport, Iowa.
- Pr. Ent. Soc. Wash.—Proceedings of the Entomological Society of Washington.
- Pr. Haw. Ent. Soc.—Proceedings of the Hawaiian Entomological Society.
- Redia.—Redia.
- Riv. Pat. Veg.—Rivista di Patologia Vegetale.
- Scale Ins. of Egypt.—Notes on the Injurious Scale Insects and Mealy Bugs of Egypt. Cairo, 1907.
- The Entom.—The Entomologist.
- Trab. Mus. Farm. Fac. Cienc. Med.—Trabajos del Museo de Farmacologia de la Facultad de Ciencias Médicas. Buenos Aires, Argentina.
- Tr. Linn. Soc. Lond.—Transactions of the Linnæan Society of London.
- Victorian Nat.—The Victorian Naturalist.
- Zeitschr. f. wiss. Insektenbiol.—Zeitschrift für wissenschaftliche Insektenbiologie.



TECHNICAL SERIES, No. 16, PART V.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

THE GENUS *FIORINIA* IN THE
UNITED STATES.

BY E. R. SASSCER,

Scientific Assistant.

ISSUED DECEMBER 6, 1912.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

CONTENTS.

	Page.
Introduction.....	75
Description of the Genus <i>Fiorinia</i>	75
<i>Fiorinia theæ</i> Green.....	76
<i>Fiorinia fioriniæ</i> Targioni Tozetti.....	79
<i>Fiorinia fioriniæ minor</i> Maskell.....	79
<i>Fiorinia fioriniæ japonica</i> Kuwana.....	81

ILLUSTRATIONS.

	Page.
PLATES.	
PLATE X. Anal plate of <i>Fiorinia theæ</i>	76
XI. Fig. 1.— <i>Fiorinia theæ</i> on leaf of <i>Camellia</i> . Fig. 2.— <i>Fiorinia theæ</i> on leaf of <i>Camellia</i>	76
XII. Anal plate of <i>Fiorinia fioriniæ</i>	80
XIII. Anal plate of <i>Fiorinia fioriniæ minor</i>	80

ii

ADDITIONAL COPIES of this publication
may be procured from the SUPERINTEND-
ENT OF DOCUMENTS, Government Printing
Office, Washington, D. C. at 10 cents per copy

PAPERS ON COCCIDÆ OR SCALE INSECTS.

THE GENUS *FIORINIA* IN THE UNITED STATES.By E. R. SASSCER, *Scientific Assistant.*

INTRODUCTION.

The genus *Fiorinia* at the present time consists of some 30 described species and 4 varieties, and of this number there are only 2 species and 1 variety established in this country, viz, *Fiorinia fiorinix* Targioni Tozetti, *F. theæ* Green, and *F. fiorinix japonica* Kuwana. Judging from the available records at hand, it is quite evident that the first two coccids mentioned were imported on ornamental plants, and their status in some locations is such as to warrant the use of remedial measures. The last-named variety of *fiorinix* is a Japanese importation, and while it appears to be established in only one State, it is not infrequently collected at quarantine on imported evergreens.

Fiorinia TARGIONI.

This genus is characterized by the adult female being smaller, decreasing in size after the second molt, and entirely inclosed in the second larval exuvia; puparium elongate, with first larval exuvia extending beyond the margin. Male scales white, elongate, with or without carinæ, larval exuvia at anterior extremity. Pygidium of adult female (*Fiorinia* s. str.), possessing well-defined median lobes, and some species exhibiting a small pair on either side; paragenitals normally in five groups, although in some species the median and anterior laterals coalesce, forming an arch.

Leonardi in his paper,¹ "Saggio de Sistematica delle Fiorionix" divides *Fiorinia* sens. lat. into three subgenera, viz, *Trullifiorinia* (paragenitals and lobes present), *Anamefiorinia* (paragenitals present, lobes absent), and *Adiscofiorinia* (paragenitals absent). *Fiorinia* s. str. is characterized by possessing paragenitals and plates, and the species discussed in this paper come distinctly within this division.

¹Redia, vol. 3, p. 16, 1905.

The following table, based on characters exhibited by the adult female, is offered as a means for separation of the species occurring in the United States.

- I. Spatulate protuberance between antennæ present, first pair of lateral lobes represented by serrate thickenings *F. theæ* Green.
- II. Spatulate protuberance between antennæ absent, first pair of lateral lobes prominent.
- (a) Median and anterior lateral paragenitals usually contiguous, 21-23; posterior laterals 10-16..... *F. fioriniæ* Targ.
- (b) Paragenitals massed and numerous; median 3-11, anterior laterals 16-24, posterior laterals 19-31..... *F. fioriniæ* var. *japonica* Kuw.

THE TEA SCALE.

Fiorinia theæ GREEN.

PLATES X AND XI.

- Fiorinia fioriniæ* var. *camelliæ* Rolfe and Quaintance, Coccidæ Americanæ. Decades i-iii, No. 6 (1898).
- Fiorinia theæ* Green, Indian Museum Notes, V, No. 1, p. 3 (1900). Fig.
- Fiorinia theæ* Stebbing, Insects that affect forestry, No. 1, p. 133 (1902). Fig.
- Fiorinia theæ* Green, Indian Museum Notes, V, No. 3, p. 102 (1903). Record only.
- Fiorinia theæ* Fernald, Catalogue of the Coccidæ of the world, p. 250 (1903).
- Fiorinia theæ* Watt and Mann, The pests and blights of the tea plant, p. 306, Calcutta, 2d edition (1903). Fig.
- Fiorinia theæ* Leonardi, Redia, III, p. 28 (1905). Fig. "Saggio di Sistematica Delle Fioriniæ."
- Fiorinia theæ* Green and Mann, Memoirs of the Department of Agriculture in India, Entomological Series, I, No. 5, pp. 343, 350 (1907). Bibliography and record only.
- Fiorinia theæ* Green, Memoirs of the Department of Agriculture in India, Entomological Series, II, No. 2, p. 39 (1908). Record only.
- Fiorinia theæ* Stebbing, Manual of forest zoology for India, p. 165 (1908). Fig.
- Fiorinia theæ* Lindinger, Zeitschr. f. wiss. Insektenbiol., VII, 4, p. 127 (1911).

Notwithstanding the fact that the tea scale, *Fiorinia theæ* Green, has been in the National Collection of Coccidæ since 1887 identified as *F. fioriniæ* Targ., it was not described until 1900 by Green on tea from Assam and Kangra, India. A thorough study of the material in this collection revealed the fact that all the specimens on *Camellia*, with the exception of Comstock's type of *F. camelliæ*, which is now recognized as a synonym of *F. fioriniæ* Targ., are the tea scale of Green.

In 1897 Cockerell¹ recorded what he considered a distinct variety of *F. fioriniæ* Targ. on the underside of a leaf of *Camellia japonica* from Baton Rouge, La., and, judging from his partial description he surely had reference to *F. theæ* Green.

A microscopic study of the material in "Coccidæ Americanæ" (Decades i-iii, No. 6 [1898]), distributed by Rolfs and Quaintance

¹ Bul. Bot. Dept. Jamaica, n. s. 4, p. 149 (1897).



ANAL PLATE OF FIORINIA THEAE. MAGNIFIED 580 DIAMETERS. (ORIGINAL.)



FIG. 2.—FIORINIA THEÆ ON CAMELLIA LEAF. ENLARGED FIVE TIMES. (ORIGINAL.)



FIG. 1.—FIORINIA THEÆ ON LEAF OF CAMELLIA. TWICE ENLARGED. (ORIGINAL.)

and labeled *F. fioriniæ* var. *camelliæ*, proves it to be *F. theæ* Green and not a variety.

In March, 1908, Mr. George F. Mitchell, of the Experimental Tea Farm at Summerville, S. C., submitted leaves of tea thickly infested with *Fiorinia theæ* Green and stated that it was becoming a serious enemy of this plant. At the request of Dr. R. H. True, Mr. J. G. Sanders, at that time an agent of the Bureau of Entomology, visited the tea farm and found this scale in abundance on Assam hybrid, Darjeeling, and China teas and camellias grown for ornamental purposes. Mr. Sanders observed that the Darjeeling tea which was grown in moist lowland was frequently covered with a brown fungus, which was apparently parasitic on the scale.

It is the belief of Dr. Charles U. Shepard, who is in charge of the experimental farm, that the tea affords better food than *Camellia japonica*, and he states that it is seldom if ever that the latter plant is killed by attack of this insect alone.

Since no plants have been introduced from Asiatic regions, all being grown from seed, it is extremely probable that its introduction was through the agency of the camellias, which have been for a number of years greatly in demand as ornamental plants in this country.

According to Watt and Mann¹ this scale is of common occurrence in both Assam and Kangra, and is the most prevalent of all coccids in the former Province. Mr. Stebbing² records it on the leaves of the olive, *Olea glandulifera*, in the northwestern Himalayas, frequently causing the leaves to turn yellow and drop off.

Although this insect occurs on both sides of the leaves of tea and *Camellia japonica*, it is more commonly found on the underside, and if present in sufficient numbers it can be easily detected by yellow markings plainly to be seen on the upper surface.

Fiorinia theæ Green can be readily separated from *F. fioriniæ* Targ. by the larger and darker scale, the presence of a proboscis-like projection between the antennæ which have no stout spines, and in the absence of lateral lobes on the pygidium.

Scale of female.—Elongate, narrow, dark brown in color, usually darker than *F. fioriniæ*, with a distinct dark median longitudinal carina; adult insect entirely inclosed in the hardened exuvia of the second stage, which varies from 1 to 1.24 mm. in length, and does not bear a secretory margin. Length, 1 to 1.40 mm. Breadth, 0.40 to 0.60 mm.

Scale of male.—Snow-white, sides nearly parallel, usually indistinctly tricarinate, pellicle pale yellow approaching lemon-yellow at extreme posterior tip. When present in large numbers the puparia

¹ The Pests and Blights of the Tea Plant (second edition), p. 306 (1903).

² Manual of Forest Zoology of India, p. 166 (1903).

are frequently covered with a flocculent secretion given off by the larvæ. Length, 0.80 to 1 mm.; breadth, about 0.40 mm.

Eggs: Arranged in double rows inclosed within the second larval exuvia.

*Female.*¹—"Adult female pale yellow, of normal form. Antennæ close together, on anterior margin; each antenna consisting of an irregular tubercle with a single curved bristle on one side. From between the antennæ springs a stout spatulate process which is not chitinous but of the same consistency as the surrounding parts of the body. Margin of thorax and abdomen with a series of minute spinneret ducts opening on to small conical tubercles. Pygidium (Pl. I) with a conspicuous median cleft, on the margin of which are situated the moderately large serrate median lobes. First pair of lateral lobes represented only by small serrate thickenings of the margin; second lateral lobes obsolete." [Although the lateral lobes are wanting in the adult, they are quite prominent on the second larval exuvia and are of the normal *F. floriniæ* type.] "Spines normal, the dorsal series rather long; one pair springing from within the median cleft. Circumgenital glands in five groups; the median and upper lateral groups together forming an almost continuous arch. Median group with four or five orifices; upper laterals, 10 to 13; lower laterals, 15 to 18. A very few circular pores with accompanying ducts, on dorsal surface, near the margin. Length, 0.50 to 0.75 mm."

DISTRIBUTION.

The tea scale is recorded on Camellias in Alabama, District of Columbia, Florida, Georgia, Louisiana, North Carolina, and South Carolina. It has been collected in Ceylon, Philippine Islands, and India, occurring in the following localities in the latter country: Kangra Valley, Assam, Bashahr State close to Kilta in the Sutlej Valley, Calcutta, and the northwestern Himalayas.

FOOD PLANTS.

In the United States this scale has only been collected on camellias and tea, but in India it has been recorded on tea, olive (*Olea glandulifera*), and citrus. In the Philippine Islands it occurs on a species of *Caryola*, and Mr. R. S. Woglum has collected it on *Ostodes* in the Royal Botanical Gardens of Peradenyia, Ceylon. Although *F. theæ* seems to show a preference to the tea at Summerville, S. C., it appears to be quite a serious pest on the camellias in several of the more Southern States, and is not infrequently found associated with *Lepidosaphes lasianthi* Green.

¹ Owing to the accuracy of Mr. E. E. Green's description of this species it has been deemed wise to give it verbatim. (Indian Museum Notes, 5, No. 1, p. 3 (1900).)

ENEMIES.

The following predaceous beetles which have been determined by Mr. E. A. Schwarz, of the Bureau of Entomology, were found by Mr. Sanders preying on the tea scale: *Chilocorus bivulnerus* Muls., *Microweisea misella* Lec., and *Cybocephalus nigritulus* Lec. As stated elsewhere, when on the Darjeeling tea these coccids are frequently covered by a parasitic fungus, which doubtless in a measure is effective in holding this pest in check.

Fiorinia fioriniæ TARG.

PLATES XII AND XIII.

Diaspis fioriniæ Targioni, Studii sul. Cocciniglie, p. 14 (1867).

Chermes arecæ Boisduval, Insectologie Agricole, p. 262 (1868).

Fiorinia pellucida Targioni, Catalogue, p. 42 (1868).

Fiorinia camelliæ Comstock, Rep. U. S. Dept. Agr. 1880, p. 329 (1881).

Utheria fioriniæ Comstock, 2nd Rep. Dept. Ent. Cornell Univ., p. 111 (1883).

Fiorinia palmæ Green, Ind. Mus. Notes, IV, p. 5 (1896).

This coccid is a very cosmopolitan species and is of common occurrence on kentias in greenhouses. A complete bibliography of this species is not given, since it has been the subject of numerous papers, many of which, however, are of little value either from a scientific or economic standpoint.

DISCUSSION OF SYNONYMY.

A thorough study of the material on *Kentia belmoreana*, *Cycas revoluta*, and *Camellia* which was described by Comstock¹ as *Fiorinia camelliæ* proves this species to be none other than *Fiorinia fioriniæ* Targ. In 1896 Green² described a form known as *Fiorinia palmæ*, but he later reduced it to synonymy. Leonardi,³ in his paper entitled "Saggio di Systematica Delle Fioriniæ," reduces *Fiorinia fioriniæ* var. *minor* Maskell to synonymy, since Maskell in his meager description merely states that it was given varietal rank, owing to its small size. Assuming that the only character of separation was the size of the scale, Leonardi concluded that the difference was too inadequate to justify even varietal rank.

A study of the Maskell material revealed a number of characters which are surely of sufficient importance to allow it to remain as a good variety if not raised to specific rank. As will be seen by examining Plate IV, the median lobes in *minor* are larger and more chitinized, the marginal pores more numerous, varying from six to seven, and the general shape of the pygidium is different. The material of this variety is very scanty and is on the underside of a leaf which is

¹ Rep. U. S. Dept. Agr., 1880, p. 329 (1881).

² Indian Mus. Notes, IV, p. 5 (1896).

³ Redia, III, p. 16 (1905).

quite hairy, causing the scales to assume various shapes and possibly preventing them from reaching their normal dimensions. In size the pygidium of *Fiorinia fioriniæ* Targ. and *Fiorinia fioriniæ* var. *minor* Mask. compare very favorably.

DISTRIBUTION.

Fiorinia fioriniæ Targ. has a wide range of distribution and is known to occur in the following countries: Algiers, Australia, Barbados, Brazil, Ceylon, China, Egypt, Europe (Belgium and Spain), Jamaica, Japan, Madeira(?), Mauritius, Mexico, New South Wales, Peru, United States (Alabama, California, Colorado, District of Columbia, Hawaiian Islands, Louisiana, Maryland, and Massachusetts), West Africa, and Zanzibar.

FOOD PLANTS.

The food plants of this insect are numerous, some of the most important of which are the following:

Anthurium acaule, *Appolonias canariensis*, *Aralia*, *Areca aurea*, bamboo, bay, *Camellia*, *Celtis mauritiana*, *Chamærops humuli*, coconut palm, *Cupressus*, *Cycas circinalis*, *C. revoluta*, *Dracæna indivisa*, ferns, *Ficus elastica*, *Ficus* sp., *Garcinia* sp., *Hedera helix*, Japanese quince, *Kentia belmoreana*, *K. fosteriana*, *Larix* sp., *Leptospermum*, *Licula*, *Livistona*, *Persea gratissima*, *Phœnix canariensis*, *Phœnix* sp., *Phormium tenax*, *Phytelephas macrocarpa*, *Podocarpus*, *Strelitzia reginiæ*, tea (*Thea japonica*).

ENEMIES.

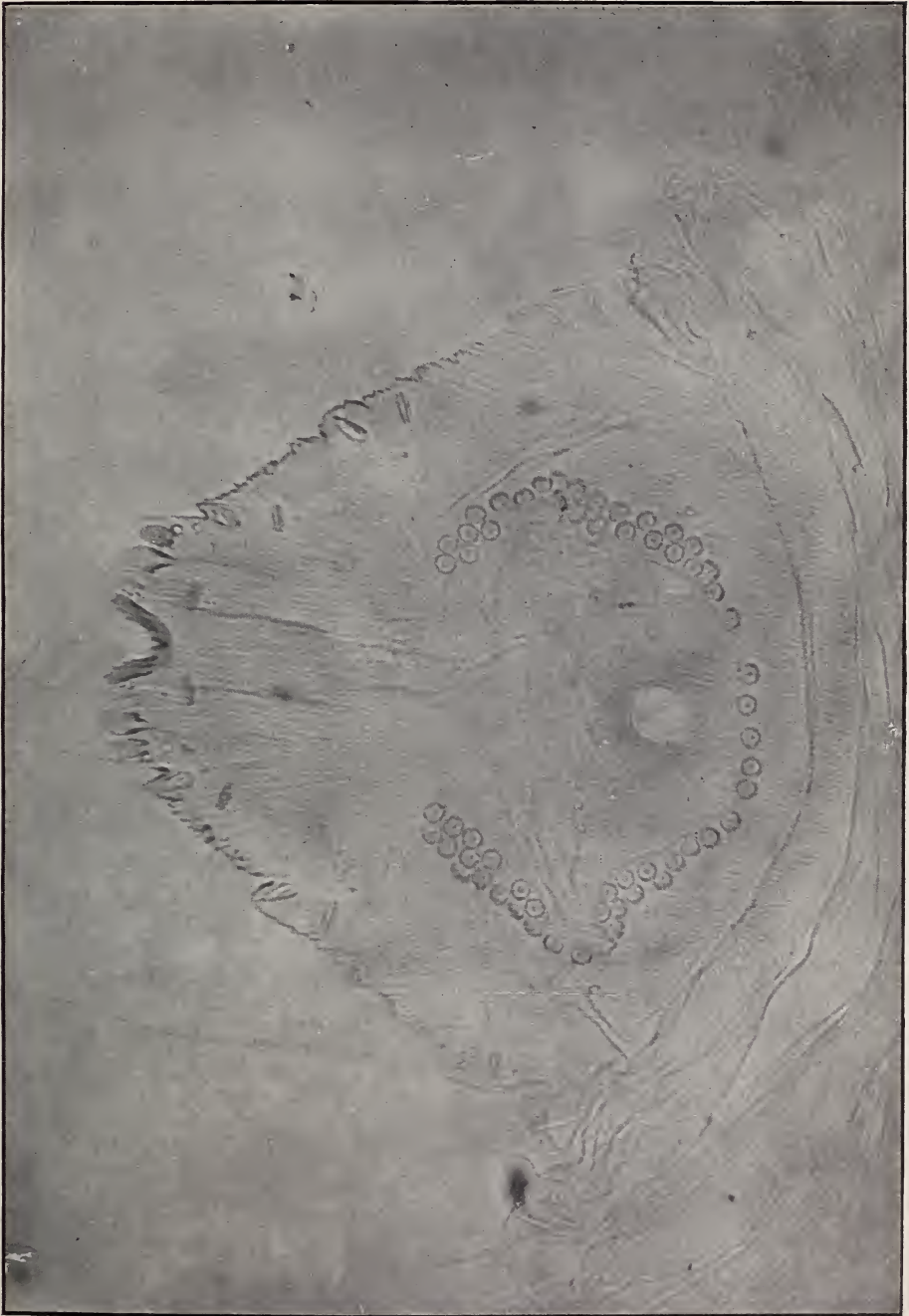
In studying the slides of the National Collection of Coccidæ one partially mature specimen of the parasite *Aspidiotiphagus citrinus* Craw was discovered inclosed in the body of an adult insect collected in Washington, D. C., on *Chæmerops humuli* and the same chalcid has also been reared from material on *Persea gratissima* from Honolulu, Hawaii. In addition to the above a species of *Aspidiotiphagus* was reared from this scale on an unknown plant collected at Hong-kong by Mr. Kcebele, and he also collected *Prospaltella aurantii* How. from this coccid on *Ficus* sp. at Swatow, Canton, China.

Among the fungous enemies of this coccid the redheaded fungus (*Sphærostilbe coccophila*) has been recorded¹ by Mr. John Parkin from Mauritius on infested *Camellia*.

DESCRIPTION.

Scale of female.—Elongate, narrow, revealing a distinct median longitudinal ridge; first larval exuvia yellow, small, and extending beyond the margin; second larval exuvia ranging from 1.20 to 1.46

¹ Ann. Roy. Bot. Gardens Peradeniya, III, p. 57 (1906).



ANAL PLATE OF FIORINIA FIORINIÆ. MAGNIFIED 608 DIAMETERS. (ORIGINAL.)



ANAL PLATE OF FIORINIA FIORINIAE VAR. MINOR. MAGNIFIED 515 DIAMETERS. (ORIGINAL.)

mm. in length and varying from brown to dark brown with frequently a white secretory margin, and inclosing the adult insect, which is situated in the anterior portion of the scale. Length 1 to 1.25 mm. Breadth about 0.50 mm.

Eggs.—Yellow and arranged in a double row.

Scale of male.—White, tricarinate, larval exuvia pale yellow, Length about 1 mm. Breadth about 0.40 mm.

Female.—Thin and much contracted after oviposition, elongate, possessing rudimentary antennæ, which are apparently two-jointed, the first consisting of a fleshy tubercle, which bears the second joint and a bristle, the second joint occasionally possessing a short lateral branch near the tip; anal plate triangular, 0.187 to 0.204 mm. in width, slightly truncate at tip, median notch distinct and formed by the median lobes, which are oblique and serrated along their entire free edge; second lobes prominent both in second larval exuvia and adult, incised, about twice as long as broad and followed by several indentations; margin of the pygidium exhibiting four rather conspicuous tubular pores; between the median lobes are two short spines; located on the dorsal surface situated along the lateral margin of the median lobe there are two spines, the posterior being the larger, one on the outer lobule of the second lobe and two situated between the second lobe and the penultimate segment; on ventral surface there is a spine corresponding with each dorsal spine, except on the first lobe; laterad of each lobe there is an elongate pore and two between the second lobule and the penultimate segment; anal opening twice the width of one median lobe and far removed from the tip; median and anterior lateral paragenitals contiguous, forming an arch, 21 to 23, posterior laterals 10 to 16.

Fiorinia fioriniæ japonica Kuw.

Fiorinia fioriniæ japonica Kuwana, Proc. Cal. Acad. Sci. (3), III, p. 79 (1902).

Fiorinia fioriniæ japonica Coleman, Journ. N. Y. Ent. Soc., XI, p. 84 (1903). Record only.

Fiorinia fioriniæ japonica Leonardi, Redia, III, Fasc. 1, p. 36 (1905). Bibliography and description.

Fiorinia fioriniæ japonica Kuwana, Bul. Imp. Cent. Agr. Exp. Sta., Japan, p. 200 (1907). Bibliography and record only.

Fiorinia fioriniæ japonica Brick, Sta. f. Pflanzenschutz z. Hamburg, XI, p. 6 (1909). Record only.

Fiorinia fioriniæ japonica Brick, Jahrb. Hamb. wiss. Anst., XXVII, p. 505 (1909). Record only.

Fiorinia fioriniæ japonica Essig, Pom. Journ. Ent., II, 2, p. 207 (1910). Description and figure.

Fiorinia fioriniæ japonica Lindinger, Zeitschr. f. wiss. Insektenbiol., VII, 4, p. 126 (1911). Record only.

Although this variety of *fioriniæ* is a native of Japan, it has been introduced into this country on numerous occasions on infested ever-

greens. In September of 1908 it was collected on *Tsuga* sp., at Queens, Long Island, by Mr. F. N. Meyer, where it had apparently become established, and subsequently it was collected in New York by Mr. E. P. Felt on Japanese hemlock. In June of 1909 it was collected on the fruit and leaves of *Podocarpus elata* received by the Bureau of Plant Industry from the Botanical Gardens of New South Wales. Mr. Edward M. Ehrhorn, while horticultural commissioner of California, collected it at quarantine on *Podocarpus chinensis* and *Pinus* sp. Mr. Lindinger in a recent paper¹ records it from the Philippine Islands on *Podocarpus nageia* and *Abies veitchi* and Mr. Brick reports it from Japan on *Pinus pentaphylla*, *P. thunbergi*, and *Tsuga sieboldi*.

DESCRIPTION.

Scale of female.—Fresh female scales frequently covered with a white powdery substance, median carina indistinct and frequently not visible, brown to dark brown, reaching a chestnut brown at the anterior end of the scale; first larval exuvia yellow, about three-fourths of it extending beyond the margin; second larval exuvia 1.80 to 2 mm. in length and from 0.60 to 0.80 mm. in breadth. When collected on *Tsuga* sp., it usually occurs on the underside of the leaves, although this does not hold true in the case of the specimens on *Podocarpus*.

Scale of male.—White, apparently uncarinated, larval exuvia yellow. Length about 1 mm. Breadth about 0.40 mm.

Female.—Thin, pygidium slightly brownish, antennæ rudimentary, apparently two-jointed, the second joint bearing a spine; width of pygidium 0.187 to 0.255 mm., slightly truncate at tip, median lobes serrated along free edge, oblique, forming a distinct notch, second lobes conspicuous in both second larval exuvia and adult, incised, approximately twice as long as broad, six prominent tubular pores on the margin of the pygidium with two very short spines between the median lobes; gland spines simple, long, one laterad of each lobe and one on the margin near the penultimate segment; on the dorsal surface along the lateral margin of the median lobes there are two spines, the posterior being the larger, one on the outer lobule of the second lobe, and two between second lobe and penultimate segment. Anal opening far removed from the tip and twice the width of a median lobe. Paragenitals in five groups, arranged as follows: Median group 3 to 11, anterior laterals 16 to 24, posterior laterals 19 to 31.

¹ Loc. cit.

TECHNICAL SERIES, No. 16, PART VI.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

CATALOGUE

OF

RECENTLY DESCRIBED COCCIDÆ—IV.

BY E. R. SASSCER,
Scientific Assistant.

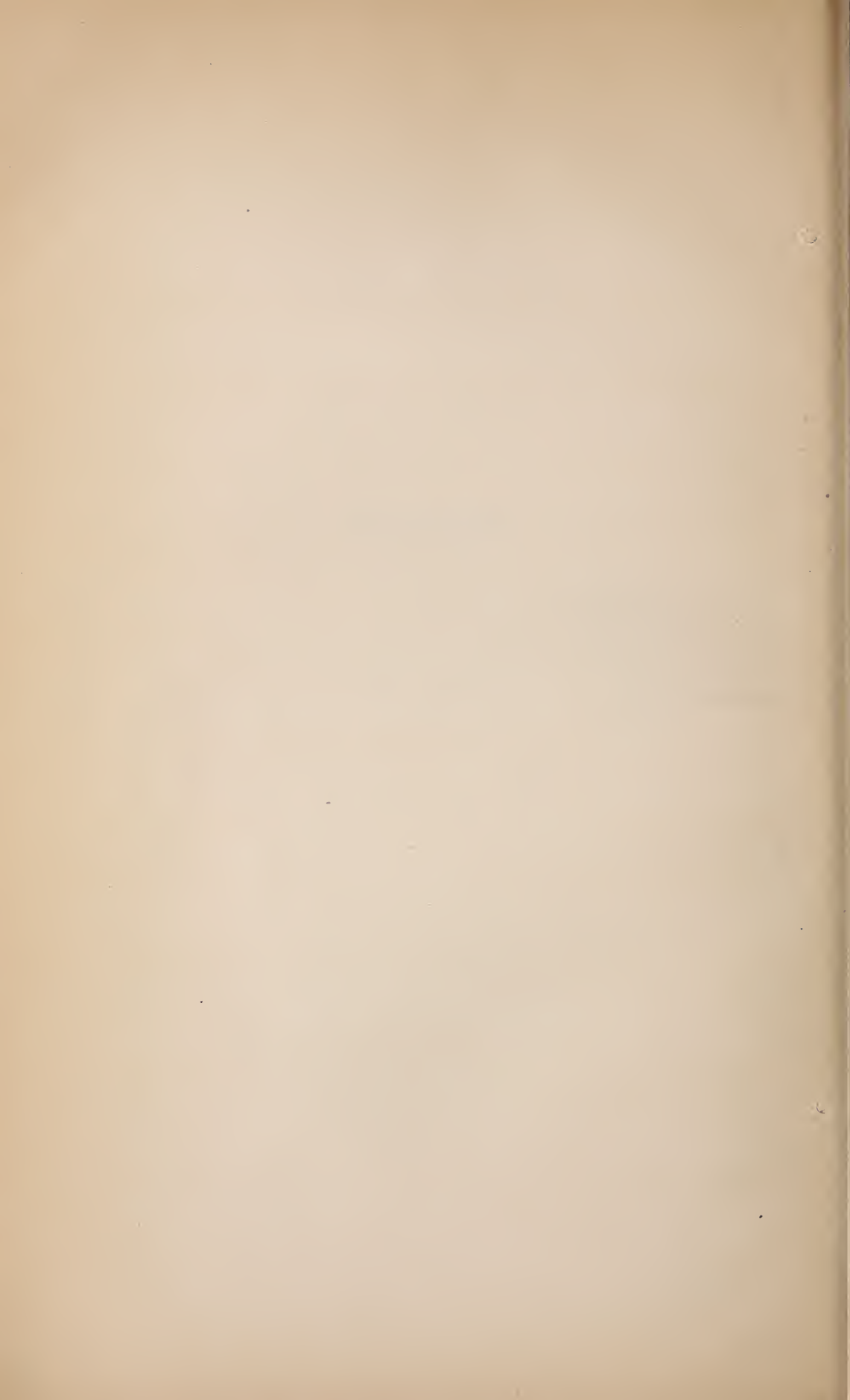
ISSUED OCTOBER 19, 1912.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

CONTENTS.

	Page.
Subfamily Monophlebinae.....	83
Subfamily Ortheziinae.....	84
Subfamily Dactylopiinae.....	84
Subfamily Tachardiinae.....	87
Subfamily Coccinae.....	87
Subfamily Diaspinae.....	89



PAPERS ON COCCIDÆ OR SCALE INSECTS.

CATALOGUE OF RECENTLY DESCRIBED COCCIDÆ—IV.

By E. R. SASSCER, *Scientific Assistant.*

Since the publication of the "Catalogue of Recently Described Coccidæ—III,"¹ 6 new genera, 110 new species, and 4 new varieties have been described in various publications by workers on Coccidæ. This makes a total of 29 new genera, 9 new subgenera, 540 new species, and 45 new varieties recorded since the appearance of Mrs. Fernald's Catalogue in 1903. The writer believes this list to be fairly complete to March, 1912, and earnestly requests the assistance of coworkers in adding any references that may have escaped his notice.

All species marked with an asterisk are represented in the National Collection of Coccidæ.

Subfamily **MONOPHLEBINÆ.****Monophlebus africanus** Newstead.

Monophlebus africanus Newst., Zool. Anthr. Ergeb. westl. zentr. Südafri., v, 1, p. 15 (1912). Fig.

Habitat—Dutch Southwest Africa.

On roots of ! "kxuibes"—plant.

Stigmaticoccus zimmermanni Newstead.

Perissopneumon zimmermanni Newst., Mitt. zool. Mus. Berlin, v, 2, p. 157 (1911).

Habitat—German East Africa.

On *Manihot glazionii*.

Aspidioproctus armatus Newstead.

Aspidioproctus armatus Newst., Mitt. zool. Mus. Berlin, v, 2, p. 160 (1911). Fig.

Habitat—German East Africa.

On *Acacia*.

Aspidioproctus maximus Newstead.

**Aspidioproctus maximus* Newst., Mitt. zool. Mus. Berlin, v, 2, p. 158 (1911). Fig.

Habitat—German East Africa.

On M'sasa tree (*Brachystegia randii*).

¹Sasscer, E. R., "Catalogue of Recently Described Coccidæ—III," Tech. Ser. 16, Part IV, Bur. Ent., U. S. Dept. Agr., 1911.

Icerya longisetosa Newstead.

Icerya longisetosa Newst., Mitt. zool. Mus. Berlin, v, 2, p. 155 (1911). Fig.
Habitat—German East Africa.
On *Acacia*.

Icerya subandina Leonardi.

Icerya subandina Leon., Bol. Zool. Sc. Sup. Portici, v, p. 238 (1911). Fig.
Habitat—Argentina.
On *Bulnesia retana*.

Lophococcus mirabilis tricornis Newstead.

Lophococcus mirabilis tricornis Newst., Zool. anthr. Ergeb. westl. zentr. Südafr.,
v, 1, p. 17 (1912). Fig.
Habitat—Dutch Southwest Africa.
On ?

Subfamily **ORTHEZIINÆ**.**Orthezia varipes** Leonardi.

Orthezia varipes Leon., Bol. Zool. Sc. Sup. Portici, v, p. 240 (1911). Fig.
Habitat—Argentina.
On *Atriplex lampa*.

Subfamily **DACTYLOPIINÆ**.**Opisthoscelis** (?) *prosopidis* Kieffer and Jorgensen.

Opisthoscelis prosopidis Kieffer and Jorgensen, Centr. f. Bakt. Par. u. Infekt., xxvii,
2, p. 417 (1910). Fig.
Habitat—Argentina.
In galls of *Prosopis adesmioides*.

Asterolecanium coffeæ Newstead.

Asterolecanium coffeæ Newst., Mitt. zool. Mus. Berlin, v, 2, p. 161 (1911). Fig.
Habitat—German East Africa.
On *Coffea arabica*.

Lecaniodiaspis africana Newstead.

Antonina (?) *africana* Newst. (sine descr.), Liverpool Univ., Quart. Jn., i, 2, pp. 69,
72 (1906).
Draper, Scale Insects of Egypt, p. 11 (1907).
Lecaniodiaspis africana Newst., Bul. Ent. Res., ii, 2, p. 100 (1911). Fig.
Habitat—Egypt.
On *Acacia arabica* and *Ficus* sp.

Cerococcus andinus Leonardi.

Cerococcus andinus Leon., Bol. Zool. Sc. Sup. Portici, v, p. 245 (1911). Fig.
Habitat—Argentina.
On *Tricycla patagonica*, *T. cacheuta*.

Cerococcus badius Leonardi.

Cerococcus badius Leon., Bol. Zool. Sc. Sup. Portici, v, p. 243 (1911). Fig.
Habitat—Argentina.
On *Vendtia calycina*, *Baccharis rosmarinifolia*.

Birchippia americana Leonardi.*Birchippia americana* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 246 (1911). Fig.

Habitat—Argentina.

On *Larrea divaricata*, *L. cuneata*.**Kermes shastensis** Ehrhorn.*Kermes shastensis* Ehrh., Can. Ent., xliii, 8, p. 275 (1911).

Habitat—California.

On *Quercus chrysolepis*.**Eriococcus diversispinus** Leonardi.*Eriococcus diversispinus* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 249 (1911). Fig.

Habitat—Argentina.

On *Zuccagnia punctata*.**Eriococcus eriogoni** Ehrhorn.*Eriococcus eriogoni* Ehrh., Can. Ent., xliii, 8, p. 276 (1911).

Habitat—Arizona.

On *Eriogonum stellatum*.**Eriococcus parcispinosus** Leonardi.*Eriococcus parcispinosus* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 248 (1911). Fig.

Habitat—Argentina.

On *Atriplex lampa*.**Eriococcus salinus** Ehrhorn.*Eriococcus salinus* Ehrh., Can. Ent., xliii, 8, p. 276 (1911).

Habitat—California.

On roots of grass (*Distichlis* sp.?).**Gymnococcus lahillei** Leonardi.*Gymnococcus lahillei* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 251 (1911). Fig.

Habitat—Argentina.

On *Larrea divaricata*, *L. cuneata*.**Cissococcus ? oahuensis** Ehrhorn.*Cissococcus ? oahuensis* Ehrh., Proc. Haw. Ent. Soc., ii, 4, pp. 149, 179 (1912). Fig.

Habitat—Hawaiian Islands.

On Opuhe (*Urera sandwichensis*).**Sphærococcus cupressi** Ehrhorn.*Sphærococcus cupressi* Ehrh., Can. Ent., xliii, 8, p. 277 (1911). Fig.

Habitat—California.

"Under dry bark and in crevices on trunk of *Cupressus macrocarpa*."**Ceroputo koebelei** Ehrhorn.*Ceroputo koebelei* Ehrh., Can. Ent., xliii, 8, p. 278 (1911). Fig.

Habitat—Arizona.

On *Quercus engelmanni*.

Genus **LACHNODIELLA** von Ihering. Type, *cecropiæ*.

Lachnodiella von Iher. (sine descr.), Bot. Jahrb., xxxix, 5, p. 680 (1907).

Sanders, Catalogue Coccidæ—II, p. 40 (1909).

Hempel, Rev. Mus. Paul., viii, p. 52 (1911). Descr.

Lachnodiella cecropiæ von Ihering.

Lachnodiella cecropiæ von Iher. (sine descr.), Bot. Jahrb., xxxix, 5, p. 680 (1907).

Sanders, Catalogue Coccidæ—II, p. 40 (1909).

Hempel, Rev. Mus. Paul., viii, p. 52 (1911). Descr.

Habitat—Brazil.

On *Cecropia adenopus*.

Trionymus californicus Ehrhorn.

Trionymus californicus Ehrh., Can. Ent., xliii, 8, p. 279 (1911). Fig.

Habitat—California.

On *Festuca* sp.

Pseudococcus aridorum Lindinger.

Pseudococcus aridorum Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 7 (1911). Fig.

Habitat—Canary Islands.

On *Argyranthemum frutescens*, *Cytisus prolifer* var. *palmensis*, grass, *Trifolium panormitanum*.

Pseudococcus crotonis Green.

Dactylopius crotonis Green (sine descr.), Trop. Agr., xxiv, p. 44 (1905).

Pseudococcus crotonis Sanders, Catalogue Coccidæ—I, p. 5 (1906).

Dactylopius crotonis Green, Jn. Econ. Biol., vi, 2, p. 35 (1911). Fig.

Habitat—Ceylon.

On *Castilloa elastica*, variegated croton (*Codiaeum variegatum*), *Terminalia catappa*, *Erythrina lithosperma*.

Pseudococcus ledi Cockerell.

**Pseudococcus ledi* Ckll., Ent. News, xxii, 5, p. 217 (1911).

Habitat—New York.

On *Ledum grœnlandicum*.

Pseudococcus mendozinus Leonardi.

Pseudococcus mendozinus Leon., Bol. Zool. Sc. Sup. Portici, v, p. 255 (1911). Fig.

Habitat—Argentina.

On *Hyalis argentea*.

Pseudococcus obtusus Newstead.

Dactylopius (*Pseudococcus*) *obtusus* Newst., Mitt. zool. Mus. Berlin, v, 2, p. 164 (1911).

Fig.

Habitat—German East Africa.

On *Baobabrinde*.

Pseudococcus percerosus Leonardi.

Pseudococcus percerosus Leon., Bol. Zool. Sc. Sup. Portici, v, p. 254 (1911). Fig.

Habitat—Argentina.

On *Gourliea decorticans*.

Genus **HELIOCOCCUS** Sulc. Type, *bohemicus*.

Heliococcus Sulc, Čas. Společ. Ent., ix, 1, p. 39 (1912).

Helicococcus bohemicus Sulc.

- Helicococcus bohemicus* Sulc, Čas. Společ. Ent., ix, 1, p. 39 (1912). Fig.
Habitat—Bohemia and Moravia.
On *Robinia pseudacacia*.

Ripersia grandulifera Newstead.

- Ripersia grandulifera* Newst., Zool. anthr. Ergeb. westl. zentr. Südafr., v, 1, p. 17 (1912). Fig.
Habitat—Southwest Africa.
On *Adiantum* sp.

Subfamily **TACHARDIINÆ**.**Tachardia albizziæ** Green.

- Tachardia albizziæ* Green (sine descr.), Ind. Mus. Notes, v, p. 98 (1903).
Tachardia albizziæ Sanders, Catalogue Coccidæ—I, p. 6 (1906).
Tachardia albizziæ Green, Jn. Econ. Biol., vi, 2, p. 32 (1911). Fig. Description.
Habitat—Ceylon.
On *Landolphia* sp., *Albizzia stipulata*, *Filicium decipiens*, *Harpullia cupanioides*,
Croton lacciferum, *Theobroma cacao*, *Sleichera trijuga*.

Tachardia cordaliæ Leonardi.

- Tachardia cordaliæ* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 258 (1911). Fig.
Habitat—Argentina.
On *Cordia lineata*.

Tachardia longisetosa Newstead.

- Tachardia longisetosa* Newst., Bul. Ent. Res., ii, 2, p. 102 (1911).
Habitat—Uganda.
On bark-cloth (*Fiscus* sp.).

Tachardia lycii Leonardi.

- Tachardia lycii* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 256 (1911). Fig.
Habitat—Argentina.
On *Lycium chilense*.

Subfamily **COCCINÆ**.**Pulvinaria argentina** Leonardi.

- Pulvinaria argentina* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 260 (1911). Fig.
Habitat—Argentina.
On *Lycium chilense*, *Fabiana denudata*.

Pulvinaria plana Lindinger.

- Pulvinaria plana* Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 34 (1911). Fig.
Habitat—Canary Islands.
On underside of leaves of *Laurus canariensis*.

Luzulaspis spinulosa Leonardi.

- Luzulaspis spinulosa* Leon., Bol. Zool. Sc. Sup. Portici, v, p. 262 (1911). Fig.
Habitat—Argentina.
On *Atriplex lampa*.

Ceroplastes breviseta Leonardi.

Ceroplastes breviseta Leon., Bol. Zool. Sc. Sup. Portici, v, p. 264 (1911). Fig.
Habitat—Argentina.
On *Atriplex lampa*.

Ceroplastes galeatus Newstead.

Ceroplastes galeatus Newst., Bul. Ent. Res., ii, 2, p. 95 (1911). Fig.
Habitat—Uganda.
On ?

Ceroplastes irregularis Leonardi.

Ceroplastes irregularis Leon., Bol. Zool. Sc. Sup. Portici, v, p. 271 (1911). Fig.
Habitat—Argentina.
On *Larrea cuneata*.

Ceroplastes longiseta Leonardi.

Ceroplastes longiseta Leon., Bol. Zool. Sc. Sup. Portici, v, p. 268 (1911). Fig.
Habitat—Argentina.
On *Fabiana denudata*.

Ceroplastes subrotundus Leonardi.

Ceroplastes subrotundus Leon., Bol. Zool. Sc. Sup. Portici, v, p. 266 (1911). Fig.
Habitat—Argentina.
On *Cercidium andicolum*.

Ceroplastes subsphæricus Newstead.

Ceroplastes subsphæricus Newst., Mitt. zool. Mus. Berlin, v, 2, p. 166 (1911).
Habitat—German East Africa.
On *Albizzia lebbek*.

Ceroplastes ugandæ Newstead.

Ceroplastes ugandæ Newst., Bul. Ent. Res., ii, 2, p. 94 (1911). Fig.
Habitat—Uganda.
On "Amakebe."

Ceroplastes vinsonioides Newstead.

Ceroplastes vinsonioides Newst., Bul. Ent. Res., ii, 2, p. 96 (1911). Fig.
Habitat—Uganda.
On *Coffea*.

Ceroplastes gowdeyi Newstead.

Ceroplastes gowdeyi Newst., Bul. Ent. Res., ii, 2, p. 98 (1911). Fig.
Habitat—Uganda.
On African bark-tree (*Ficus* sp.).

Inglisia castilloæ Green.

Inglisia castilloæ Green, Jn. Econ. Biol., vi, 2, p. 29 (1911). Fig.
Habitat—Ceylon.
On *Castilloa elastica*, *Grewia microcos*, *Adenochlæna zeylanica*, *Solanum* sp., *Vernonia* sp., and tea.

Coccus nyasæ Newstead.

Lecanium nyasæ Newst., Mitt. zool. Mus. Berlin, v, 2, p. 162 (1911). Fig.
Habitat—German East Africa.
On ?

Lecanium elegans Leonardi.

Eulecanium elegans Leon., Bol. zool. Sc. Sup. Portici, v, p. 273 (1911). Fig.
Habitat—Argentina.
On *Larrea cuneata*, *L. divaricata*.

Lecanium tenuivalvatum Newstead.

Lecanium tenuivalvatum Newst., Bul. Ent. Res., ii, 2, p. 92 (1911). Fig.
Habitat—Uganda.
On citronella grass.

Lecanium tremæ Newstead.

Lecanium (Eulecanium) tremæ Newst., Mitt. zool. Mus. Berlin, v, 2, p. 162 (1911).
Fig.

Lecanium (Eulecanium) tremæ Newst., Bul. Ent. Res., ii, 2, p. 93 (1911).
Habitat—German East Africa.
On *Trema guineensis*.

Saissetia silvestrii Leonardi.

Saissetia silvestrii Leon., Bol. Zool. Sc. Sup. Portici, v, p. 275 (1911). Fig.
Habitat—Argentina.
On *Zuccagnia punctata*.

Subfamily DIASPINÆ.**Chionaspis africana Newstead.**

Chionaspis africana Newst., Zool. anthr. Ergeb. westl. zentr. Südafr., v, 1, p. 19
(1912). Fig.
Habitat—Southwest Africa.
On?

Chionaspis amaniensis Lindinger.

Chionaspis amaniensis Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 42 (1910). Fig.
Habitat—German East Africa.
On underside of an undertermined dicotyledonous leaf.

Chionaspis arthrocnemi Lindinger.

Chionaspis arthrocnemi Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 11, p. 354 (1911).
Fig.
Habitat—Turkey.
On *Arthrocnemum macrostachyum*.

Chionaspis canariensis Lindinger.

Chionaspis canariensis Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 26 (1911). Fig.
Habitat—Canary Islands.
On *Plocama pendula*, *Micromeria ericifolia*, *M. linki*, *M. teneriffæ*, *M. terebinthacea*,
Micromeria sp., *Ruta oreojasme*, *Salsola longifolia*, *Cneorum pulverulentum*,
Cytisus filiper.

Chionaspis cassiæ Newstead.

Chionaspis cassiæ Newst., Bul. Ent. Res., ii, 2, p. 89 (1911). Fig.
Habitat—Uganda.
On *Cassia floribunda*.

Chionaspis longispina Newstead.

Chionaspis longispina Newst., Bul. Ent. Res., ii, 2, p. 88 (1911). Fig.
Habitat—Egypt.
On *Justicia alba*.

Chionaspis mytilaspiformis Newstead.

Chionaspis mytilaspiformis Newst., Zool. anthr. Ergeb. westl. zentr. Südafr., v, 1, p. 19 (1912). Fig.

Habitat—Southwest Africa.

On *Rhus lancea*.

Chionaspis nudata Newstead.

Chionaspis nudata Newst., Mitt. zool. Mus. Berlin, v, 2, p. 170 (1911). Fig.

Habitat—German East Africa.

On (?)

Chionaspis subnudata Newstead.

Chionaspis subnudata Newst., Zool. anthr. Ergeb. westl. zentr. Südafr., v, 1, p. 19 (1912). Fig.

Habitat—Southwest Africa.

On "I obarus."

Diaspis atlantica Lindinger.

Diaspis atlantica Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 28 (1911). Fig.

Habitat—Canary Islands.

On leaf of *Juniperus phænicea*.

Diaspis barrancorum Lindinger.

Diaspis barrancorum Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, p. 29 (1911). Fig.

Habitat—Canary Islands.

On *Euphorbia regis-jubæ*.

Diaspis parva Lindinger.

Diaspis parva Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 44 (1910). Fig.

Habitat—German East Africa.

On leaf and twig of *Loranthus undulatus* var. *sagittifolius*.

Diaspis regularis Newstead.

Diaspis regularis Newst., Bul. Ent. Res., ii, 2, p. 86 (1911). Fig.

Habitat—Uganda.

On (?)

Aulacaspis cinnamomi mangiferæ Newstead.

Diaspis (Aulacaspis) cinnamomi v. *mangiferæ* Newst., Bul. Ent. Res., ii, 2, p. 86 (1911). Fig.

Habitat—Egypt (imported from Ceylon).

On mango.

Phenacaspis bussii Newstead.

Chionaspis bussii Newst., Mitt. zool. Mus. Berlin, v, 2, p. 171 (1911).

Habitat—German East Africa.

On *Macrolobium* sp.

Phenacaspis lutea Newstead.

Chionaspis lutea Newst., Mitt. zool. Mus. Berlin, v, 2, p. 169 (1911). Fig.

Habitat—German East Africa.

On forest tree, under fungus.

Phenacaspis tangana Lindinger.

Phenacaspis tangana Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 45 (1910). Fig.

Habitat—German East Africa.

On leaf of *Dracæna* sp.

Hemichionaspis chionaspiformis Newstead.

Diaspis (P) *chionaspiformis* Newst., Bul. Ent. Res., i, 3, p. 198 (1910). Fig.

Chionaspis unita Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 43 (1910). Fig.

Hemichionaspis chionaspitiformis Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, Berichtigung (1910).

Diaspis (P) *chionaspiformis* Sasser, Catalogue Coccidæ—III, p. 68 (1911).

Habitat—British and German East Africa.

On an unknown plant and *Turraea* sp.

Crythemichionaspis Lindinger. Type, *nigra*.

Crythemichionaspis Lindgr.,¹ Zeitschr. f. wiss. Insektenbiol., vii, 5, 6, p. 175 (1911).

Crythemichionaspis nigra Lindinger.

Crythemichionaspis nigra Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 5, 6, p. 175 (1911). Fig.

Habitat—South Australia.

On *Acacia salicina*; *Phyllodien*.

Leucaspis indiæ-orientalis Lindinger.

Leucaspis indiæ-orientalis Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 127 (1911).

Fig.

Habitat—India.

On *Pinus kasya*.

Fiorinia africana Newstead.

Fiorinia africana Newst., Bul. Ent. Res., ii, 2, p. 90 (1911). Fig.

Habitat—Egypt.

On poplar.

Fiorinia neo-caledonica Lindinger.

Fiorinia neo-caledonica Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 5–6, p. 176 (1911).

Fig.

Habitat—New Caledonia.

On *Bæckia pinifolia*.

Fiorinia odinæ multipora Lindinger.

Fiorinia odinæ multipora Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 126 (1911).

Habitat—India.

On *Taxus wallichiana*.

Genus **CRYPTASPIDUS** Lindinger. Type, *nucum*.

Cryptaspidus Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 43 (1910).

Cryptaspidus nucum Lindinger.

Cryptaspidus nucum Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 43 (1910). Fig.

Habitat—Madagascar.

On scales of fruit of *Cocos nucifera*.

Aonidia glandulosa Newstead.

Aonidia glandulosa Newst., Draper (sine descr.), Scale Ins. of Egypt, p. 11 (1907).

Sanders, Catalogue Coccidæ—II, p. 56 (1911).

Newst., Bul. Ent. Res., ii, 2, p. 103 (1911). Fig.

Habitat—Egypt.

On "sunt" tree (*Acacia arabica*).

¹Includes *Fiorinia acaciæ* Mask., *F. lidgetti* Green, and *Crythemichionaspis nigra* n. sp.

Aonidia longa Lindinger.

Aonidia longa Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 5, 6, p. 172 (1911). Fig.
Habitat—New Caledonia.
On *Podocarpus gnidioides*.

Aonidia (?) paradoxa Lindinger.

Aonidia (?) paradoxa Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 5, 6, p. 173 (1911).
Fig.
Habitat—South Australia.
On *Casuarina glauca*.

Aonidia (?) targioniopsis Lindinger.

Aonidia (?) targioniopsis Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 3, p. 86 (1911).
Fig.
Habitat—Burma.
On *Miliusa velutina*.

Aonidia viridis Lindinger.

Aonidia viridis Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 3, p. 86 (1911). Fig.
Habitat—India.
On upper side of leaf of *Aglaiia minutiflora*.

Cryptaspidiotus aonidioides Lindinger.

Cryptaspidiotus aonidioides Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 21 (1911).
Fig.
Habitat—Canary Islands.
On leaves of *Laurus canariensis*, *Apollonias canariensis*.

Cryptaspidiotus austro-africanus Lindinger.

Cryptaspidiotus austro-africanus Lindgr. (Brick), Jahrb. Hamb. wiss. Anst., xxvii,
p. 505 (1910).
Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 41
(1911). Fig. and description.
Habitat—Natal.
On *Euphorbia* sp.

Aspidiotus argentina Leonardi.

Aspidiotus (Hemiberlesia) argentina Leon., Bol. Zool. Sc. Sup. Portici, v, p. 277 (1911).
Fig.
Habitat—Argentina.
On *Ophryoporus andinus*.

Aspidiotus bavaricus Lindinger.

Aspidiotus (Diaspidiotus) bavaricus Lindgr., Zeitschr. f. wiss. Insektenbiol., viii, 1,
p. 31 (1912).
Habitat—Bavaria, Prussia, Austria, Norway, England (?), and Portugal (?).
On *Calluna vulgaris*, *Erica tetralix*.

Aspidiotus canariensis Lindinger.

Aspidiotus canariensis Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 12 (1911). Fig.
Habitat—Canary Islands.
On stem and branch of *Argyranthemum frutescens*.

Aspidiotus euphorbiæ Newstead.

- Aspidiotus (Selenaspis) euphorbiæ* Newst., Zool. anthr. Ergeb. westl. zentr. Südafr., v, 1, p. 18 (1912). Fig.
Habitat—South Africa.
On *Euphorbia virosa*.

Aspidiotus fissidens pluridentatus Lindinger.

- Aspidiotus fissidens pluridentatus* Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 35 (1910).
Habitat—German East Africa, Mozambique.
On leaves of *Bosquiea cerasiflora*, *Sideroxylon inerme*, *Chrysophyllum stuhlmanii*.

Aspidiotus fissus Lindinger.

- Aspidiotus fissus* Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 35 (1910). Fig.
Habitat—Abyssinia.
On *Euphorbia* sp.

Aspidiotus furcræicola Lindinger.

- Aspidiotus furcræicola* Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 36 (1910). Fig.
Habitat—German East Africa.
On underside of leaf of *Furcræa gigantia*.

Aspidiotus gymnosporiæ Lindinger.

- Aspidiotus gymnosporiæ* Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 13 (1911)
Fig.
Habitat—Canary Islands.
On leaf of *Gymnosporia cassinoides*.

Aspidiotus lauretorum Lindinger.

- Aspidiotus lauretorum* Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 15 (1911).
Fig.
Habitat—Canary Islands.
On *Dracæna draco*, *Gymnosporia cassinoides*, *Ilex canariensis*, *I. platyphylla*, *Oreodaphne fetens*, *Picconia excelsa*, *Smilax canariensis*, *Hedera helix canariensis*, *Apollonias canariensis*, *Heberdenia excelsa*, *Laurus canariensis*, and Lauraceæ.

Aspidiotus mammillaris Lindinger.

- Aspidiotus mammillaris* Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 37 (1910).
Fig.
Habitat—Abyssinia.
On surface of leaves of *Aloe eru*.

Aspidiotus reticulatus Newstead.

- Aspidiotus reticulatus* Newst., Zool. anthr. Ergeb. westl. zentr. Südafr., v, 1, p. 17 (1912). Fig.
Habitat—Southwest Africa.
On monocotyledon (?)

Chrysomphalus samoana Lindinger.

- Chrysomphalus (Melanaspis) samoana* Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 5, 6, p. 177 (1911). Fig.
Habitat—Island of Samoa.
On *Myristica hypargyræa*.

Aspidiotus schultzei Newstead.

Aspidiotus (Selenaspis) schultzei Newst., Zool. anthr. Ergeb. westl. zentr. Südafri., v, 1, p. 18 (1912). Fig.

Habitat—Southwest Africa.

On succulent plant.

Aspidiotus taorensis Lindinger.

Aspidiotus taorensis Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 17 (1911). Fig.

Habitat—Canary Islands.

On *Euphorbia aphylla*, *E. regis-jubæ*.

Aspidiotus tectarius Lindinger.

Aspidiotus tectarius Lindgr., Jahrb. Hamb. wiss. Anst., xxvi, 3, p. 20 (1909). Fig.

Habitat—South America.

On leaves of *Euphorbia* sp.

Aspidiotus tinerefsis Lindinger.

Aspidiotus tinerefsis Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 18 (1911). Fig.

Habitat—Canary Islands.

On *Dracæna draco*.

Aspidiotus tsugæ Marlatt.

Aspidiotus (Diaspidiotus) tsugæ Marlatt, Ent. News, xxii, 9, p. 385 (1911). Fig.

Habitat—Japan.

On Japanese hemlock (*Tsuga* sp.).

Aspidiotus varians Lindinger.

Aspidiotus varians Lindgr., Jahrb. Hamb. wiss. Anst., xxvii, 3, p. 39 (1911). Fig.

Habitat—German East Africa, Madagascar.

On leaf and scales of fruit of *Cocos nucifera*.

Targionia (?) *campylanthi* Lindinger.

Targionia (?) *campylanthi* Lindgr., Jahrb. Hamb. wiss. Anst., xxviii, 3, p. 25 (1911).

Fig.

Habitat—Canary Islands.

On *Campylanthus solsoloides*.

Targionia fabianæ Leonardi.

Targionia fabianæ Leon., Bol. Zool. Sc. Sup. Portici, v, p. 278 (1911). Fig.

Habitat—Argentina.

On *Fabiana denudata*.

Genus **PROTARGIONIA** Leonardi. Type, *larreæ*.

Protargionia Leon., Bol. Zool. Sc. Sup. Portici, v, p. 280 (1911).

Protargionia larreæ Leonardi.

Protargionia larreæ Leon., Bol. Zool. Sc. Sup. Portici, v, p. 280 (1911). Fig.

Habitat—Argentina.

On *Larrea divaricata*, *L. cuneata*.

Lepidosaphes fasciata Green.

Lepidosaphes (Mytilaspis) fasciata Green, Jn. Econ. Biol., vi, 2, p. 31 (1911). Fig.

Habitat—Ceylon.

On leaves of *Hevea brasiliensis*.

Lepidosaphes travancorensis Lindinger.

Lepidosaphes travancorensis Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 127 (1911). Fig.

Habitat—India.

On underside of leaf of *Aglaia minutiflora*.

Genus **DINASPIS** Leonardi. Type, *ichesii*.

Dinaspis Leon., Bol. Zool. Sc. Sup. Portici, v, p. 282 (1911).

Dinaspis ichesii Leonardi.

Dinaspis ichesii Leon., Bol. Zool. Sc. Sup. Portici, v, p. 282 (1911). Fig.

Habitat—Argentina.

On *Ephedra andina*.

Dinaspis lahillei Leonardi.

Dinaspis lahillei Leon., Bol. Zool. Sc. Sup. Portici, v, p. 283 (1911). Fig.

Habitat—Argentina.

On *Bulvesia retana*.

Ischnaspis spathulata Lindinger.

Ischnaspis spathulata Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 127 (1911). Fig.

Habitat—India.

On underside of leaf of *Atica obscura*.

Parlatoria ephedræ Lindinger.

Parlatoria ephedræ Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 129. Fig.

Habitat—Persia.

On *Ephedra intermedia*, *E. nebiodensis*, *E. nebiodensis* var. *procera*.

Parlatoria hastata Lindinger.

Parlatoria hastata Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 129 (1911). Fig.

Habitat—Borneo.

On leaf of *Gnetum scandens*.

Cryptoparlatoresia uberifera Lindinger.

Cryptoparlatoresia uberifera Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 4, p. 126 (1911).

Fig.

Habitat—Philippine Islands.

On leaves of *Artocarpus* sp. and *Mallotus philippinensis*.

Cryptoparlatoresia parlatoresiodes Lindinger.

Cryptoparlatoresia parlatoresiodes Lindgr., Zeitschr. f. wiss. Insektenbiol., vii, 3, p. 89 (1911). Fig.

Habitat—India.

On surface of leaf of *Xanthophyllum flavescens*.

CORRECTION TO CATALOGUE III—1911.

On page 66 the heading "Subfamily Coccinæ" should be transferred to page 65 to precede Ceroplastidia, line 17 from bottom.

ABBREVIATIONS OF LITERATURE.¹

- Allg. Zeits. f. Ent.—Allgemeine Zeitschrift für Entomologie.
 Agr. News West Ind.—Agricultural News. West Indies.
 An. Soc. Cient. Argentina.—Anales de la Sociedad Científica Argentina.
 Ann. Soc. Ent. France.—Annales de la Société Entomologique de France.
 Annali di Agr.—Annali di Agricoltura. Portici.
 Ann. Mag. N. H.—Annals and Magazine of Natural History.
 Ann. Mus. Zool. Ac. Imp. Sc. St. Petersburg.—Annuaire Musée Zoologique Académie Impériale des Sciences de St. Petersburg.
 Berl. ent. Zeitschr.—Berliner entomologische Zeitschrift.
 Ber. Stat. f. Pflanzensch. Hamb.—Bericht der Station für Pflanzenschutz, Hamburg.
 Bol. Min. Ag.—Boletín del Ministerio de Agricultura. Argentina.
 Bol. Zool. Sc. Sup. Portici.—Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola Superiore d'Agricoltura di Portici.
 Bot. Jahrb.—Botanische Jahrbücher.
 Bul. Ag. Exp. Sta. Japan.—Bulletin of the Imperial Central Agricultural Experiment Station. Japan.
 Bul. Ent. Res.—Bulletin of Entomological Research.
 Bul. Ill. St. Lab. N. H.—Bulletin of the Illinois State Laboratory of Natural History.
 Bul. Soc. Ent. Fr.—Bulletin de la Société Entomologique de France.
 Bul. Soc. Ent. Ital.—Bulletino della Società Entomologica Italiana.
 Bul. Soc. Zoo. France.—Bulletin de la Société Zoologique de France.
 Bul. U. S. Bur. Ent., t. s. 16, Pt. II.—Bulletin, Technical Series 16, Part II, Bureau of Entomology, U. S. Department of Agriculture.
 Can. Ent.—Canadian Entomologist.
 Čas. Společ. Entom.—Časopis České Společnosti Entomologické. Acta Societatis Entomologicæ Bohemæ.
 Catalogue Coccidæ—I.—U. S. Dept. Agr., Bur. Ent., technical series, Bul. 12, Pt. I (1906).
 Catalogue Coccidæ—II.—U. S. Dept. Agr., Bur. Ent., technical series, Bul. 16, Pt. III (1909).
 Catalogue Coccidæ—III.—U. S. Dept. Agr., Bur. Ent., technical series, Bul. 16, Pt. IV (1911).
 Centr. f. Bakt. Par. u. Infekt.—Centralblatt für Bakteriologie und Parasitenkunde und Infektionskrankheiten.
 Cherm. Ital.—Chermotheca Italica.
 Cocc. Ceylon.—Coccidæ of Ceylon.
 Compt. Rend. Ac. Sci., Paris.—Comptes rendus hebdomadaires des séances de l'Académie des sciences. Paris.
 Compt. Rend. Soc. Biol.—Comptes rendus des séances de la Société de Biologie. Paris.
 Deutsche ent. Zeitschr.—Deutsche entomologische Zeitschrift.
 Ent. Mo. Mag.—The Entomologist's Monthly Magazine.
 Ent. Blätter.—Entomologische Blätter, Internationale Monatsschrift für die Biologie der Käfer Europas. Schwabach.
 Ent. News.—Entomological News.
 Ent. Rec. Jn. Variation.—The Entomologist's Record and Journal of Variation.
 Ent. Wochenblatt.—Entomologisches Wochenblatt (*antea* Insekten-Börse).
 Ind. Mus. Notes.—Indian Museum Notes.
 Insekten Börse.—Entomologisches Wochenblatt.
 Jahrb. Hamb. wiss. Anst.—Jahrbuch der Hamburgischen wissenschaftlichen Anstalten.
 Jn. Bomb. N. H. Soc.—Journal of the Bombay Natural History Society. Calcutta.

¹ This list includes abbreviations of literature used for coccid descriptions referred to in Nos. I, II, III and IV.

- Jn. Econ. Biol.—The Journal of Economic Biology.
- Jn. N. Y. Ent. Soc.—Journal of the New York Entomological Society.
- Kilimandjaro-Meru Exp.—Schwedischen zoologischen Expedition nach dem Kilimandjaro, dem Meru und den umgebenden Massaissteppen Deutsch-Ostafrikas.
- Liverpool Univ. Quart. Jn.—Institute of Commercial Research in the Tropics, Liverpool University, Quarterly Journal.
- Medd. Soc. Faun. Fenn.—Meddelanden af Societas pro Fauna et Flora Fennica.
- Mem. Dep. Ag. India.—Memoirs of the Department of Agriculture in India.
- Mem. Soc. Cient. Ant. Alz.—Memorias y Revista de la Sociedad Científica "Antonio Alzate."
- Mém. Soc. Zool. France.—Mémoires de la Société Zoologique de France.
- Mitt. zool. Mus. Berlin.—Mitteilungen aus den zoologischen Museum in Berlin.
- Nachrichtsbl. Naturfrsch.-Klubs, Prossnitz.—Nachrichtsblatt Naturforscher-Klubs, Prossnitz (Mähren).
- N. Z. Trans.—Transactions of the New Zealand Institute.
- Pests and Blights of Tea Plants.—The Pests and Blights of the Tea Plant, 2d ed. Watt & Mann, Calcutta, 1903.
- Philippine Jn. Sci.—The Philippine Journal of Science.
- Pomona College Jn. Ent.—Pomona College Journal of Entomology. Claremont, California.
- Pr. Biol. Soc. Wash.—Proceedings of the Biological Society of Washington.
- Pr. Dav. Acad. Sci.—Proceedings Davenport Academy of Sciences. Davenport, Iowa.
- Pr. Ent. Soc. Wash.—Proceedings of the Entomological Society of Washington.
- Pr. Haw. Ent. Soc.—Proceedings of the Hawaiian Entomological Society.
- Redia.—Redia.
- Rev. Mus. Paul.—Revista Museu Paulista.
- Riv. Pat. Veg.—Rivista di Patologia Vegetale.
- Scale Ins. of Egypt.—Notes on the Injurious Scale Insects and Mealy Bugs of Egypt. Cairo, 1907.
- The Entom.—The Entomologist.
- Trab. Mus. Farm. Fac. Cienc. Med.—Trabajos del Museo de Farmacologia de la Facultad de Ciencias Médicas. Buenos Aires, Argentina.
- Tr. Linn. Soc. Lond.—Transactions of the Linnæan Society of London.
- Trop. Agr.—Tropical Agriculturist.
- Victorian Nat.—The Victorian Naturalist.
- Zeitschr. f. wiss. Insektenbiol.—Zeitschrift für wissenschaftliche Insektenbiologie.
- Zool. anthr. Ergeb. westl. zentr. Südafr.—Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Südafrika.

ADDITIONAL COPIES of this publication may be procured from the SUPERINTENDENT OF DOCUMENTS, Government Printing Office, Washington, D. C., at 5 cents per copy



TECHNICAL SERIES, No. 16, PART VII.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

PAPERS ON COCCIDÆ OR SCALE INSECTS.

AN INDEX TO CATALOGUES OF RECENTLY
DESCRIBED COCCIDÆ

INCLUDED IN TECHNICAL SERIES Nos. 12 AND 16.

BY

E. R. SASSCER,
Scientific Assistant.

ISSUED JANUARY 23, 1913.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1913.

BUREAU OF ENTOMOLOGY.

L. O. HOWARD, *Entomologist and Chief of Bureau.*

C. L. MARLATT, *Entomologist and Acting Chief in Absence of Chief.*

R. S. CLIFTON, *Executive Assistant.*

W. F. TASTET, *Chief Clerk.*

F. H. CHITTENDEN, *in charge of truck crop and stored product insect investigations.*

A. D. HOPKINS, *in charge of forest insect investigations.*

W. D. HUNTER, *in charge of southern field crop insect investigations.*

F. M. WEBSTER, *in charge of cereal and forage insect investigations.*

A. L. QUAINANCE, *in charge of deciduous fruit insect investigations.*

E. F. PHILLIPS, *in charge of bee culture.*

D. M. ROGERS, *in charge of preventing spread of moths, field work.*

ROLLA P. CURRIE, *in charge of editorial work.*

MABEL COLCORD, *in charge of library.*

PAPERS ON COCCIDÆ OR SCALE INSECTS.

AN INDEX TO CATALOGUES OF RECENTLY DESCRIBED
COCCIDÆ INCLUDED IN TECHNICAL SERIES NOS. 12
AND 16.By E. R. SASSCER,
Scientific Assistant.

This index of Coccidæ includes all those forms contained in the following papers: Technical Series No. 12, Part I, "Catalogue of Recently Described Coccidæ" (1906) and Technical Series No. 16, Part III, "Catalogue of Recently Described Coccidæ—II" (1909), by James G. Sanders; Technical Series No. 16, Part IV, "Catalogue of Recently Described Coccidæ—III" (1911) and Technical Series No. 16, Part VI, "Catalogue of Recently Described Coccidæ—IV" (1912), by E. R. Sasscer. It is thus intended that it shall be an index to all the forms described and published since the issuance of Mrs. Fernald's "Catalogue of Coccidæ" in 1903, making it unnecessary to search through each of the four separate papers to find the desired citation.

INDEX.

	Technical Series No.	Page.
aberemoæ.....	16	70
aberrans.....	16	71
acaciæ.....	16	91
Aclerda.....	16	47, 67
Actenaspis.....	16	50
Adiscofiorinia.....	16	50
africana, Chionaspis.....	16	89
africana, Diaspis.....	16	68
africana, Fiorinia.....	16	91
africana, Antonina (?).....	16	43
africana, Lecaniodiaspis.....	16	84
africana, Walkeriana.....	16	61
africanus, Aspidiotus.....	16	51
africanus, Monophlebus.....	16	83
africanus senegalensis.....	16	44
agasawarensis.....	16	65
agrifoliæ.....	16	40
Akermes.....	16	46
alba.....	12	16
albizzia.....	12	6
	16	87
albospicatus.....	16	63
alluaudi.....	12	4

	Technical Series No.	Page-
<i>alni</i>	16	55
<i>amaniensis</i>	16	89
<i>ambigua</i>	16	64
<i>Amelococcus</i>	12	4
<i>americana</i>	16	85
<i>Anamaspis</i>	16	50
<i>Anamefiorinia</i>	16	50
<i>ananassæ</i>	16	64
<i>andersoni</i>	12	5
<i>andinus</i>	16	84
<i>angusta</i>	16	58
<i>angustata</i>	12	10
	16	58
<i>anomala</i>	16	65
<i>antigoni</i>	16	43
<i>Antonina</i>	12	5
	16	43, 84
<i>Aonidia</i>	12	16
	16	56
		70, 91
<i>Aonidiella</i>	12	15
	16	51, 55
<i>aonidioides</i>	16	92
<i>Aonidomytilus</i>	12	16
<i>arbutus</i> s. sp.....	16	71
<i>Arctorthezia</i>	12	2
<i>arctostaphyli</i>	16	69
<i>argentina</i> , <i>Tachardia</i>	16	43
<i>argentina</i> , <i>Pulvinaria</i>	16	87
<i>argentina</i> , <i>Aspidiotus</i>	16	92
<i>argentinus</i>	16	38
<i>aridorum</i>	16	86
<i>arii</i>	16	71
<i>armatus</i>	16	83
<i>arthrocneimi</i>	16	89
<i>arundinariæ</i>	12	8
<i>Aspidiotus</i>	12	13
	16	51, 58, 69, 92
<i>aspidistræ gossypii</i>	16	49
<i>Aspidioproctus</i>	16	83
<i>assimilis</i>	12	2
<i>Asterolecanium</i>	12	3
	16	35, 62, 84
<i>atalantiæ</i> , <i>Parlatoria</i>	12	18
<i>atalantiæ</i> , <i>Fiorinia</i>	16	50
<i>atlantica</i>	16	90
<i>Atriplicia</i>	16	37
<i>Aulacaspis</i>	16	49, 90
<i>aurantiaca</i>	12	6
<i>aurantii</i>	16	55
<i>auriculata</i>	16	56
<i>australis</i>	12	5
<i>australis</i> s. sp.....	16	34

	Technical Series No.	Page.
austro-africanus.....	16	92
azadirachtæ.....	16	63
bacciformis.....	16	36
baculifera.....	16	36
badius.....	16	84
bahiæ.....	16	37
bakeri.....	16	64
Bambusaspis.....	12	3
banksiæ.....	12	18
barberi.....	16	48
bambusano.....	16	55
barrancorum.....	16	90
bavaricus.....	16	92
beckii oleæ.....	16	56
betheli.....	12	6
beyeriæ.....	16	56
bezzii.....	16	37
biafræ.....	16	70
bicolor.....	16	57
bicornis.....	12	17
bicruciatu.....	12	8
bidens.....	12	13
biformis.....	16	54
bipindensis.....	16	71
Birchippia.....	16	85
bituberculatum.....	16	46
biwakoensis.....	16	47
bohemicus.....	16	86, 87
boninsis.....	16	64
bornmülleri.....	12	15
breviseta.....	16	88
bruneri s. sp.....	12	11
bupleuri.....	12	12
burkilli.....	16	43
bussei, Ceroplastes.....	16	44
bussii, Phenacaspis.....	16	90
buzenensis.....	16	71
<i>cacti ceylonicus</i>	16	38
cærulea.....	12	6
calophylli.....	12	9
calianthina.....	12	18
californica.....	16	35
californicus, Trionymus.....	16	86
californicus, Aspidiotus.....	12	13
campylanthi.....	16	94
canariensis, Chionaspis.....	16	89
canariensis, Aspidiotus.....	16	92
candida, Icerya.....	12	2
candida, Chionaspis.....	12	10
<i>candida</i> , Chionaspis.....	16	48
candidata.....	16	42
capensis.....	12	13
	16	54

	Technical Series No.	Page.
capparidis	12	8
capsulatus	12	13
carinata	12	16
cassiæ	16	89
cassinia	12	17
castaneæ	16	38
castilloæ	16	88
catalinæ	16	37
caudata	16	43
cecconi, Lecanium	16	46
cecconi, Aspidiotus	16	51, 72
cecropiæ	16	40, 86
cellulosa	16	66
celtis	16	71
celtium	16	66
ceratonia	12	12
Cercococcus	16	36
ceriferum, Asterolecanium	16	62
ceriferum prominens, Asterolecanium	16	62
Cerococcus	16	63, 84
Ceronema	16	43, 66
Ceroplastes	12	7
	16	44, 65, 88
Ceroplastidia s. g.	16	65
Ceroplastina s. g.	16	65
Ceroplastodes	16	45, 66
Ceroputo	16	39, 64, 85
ceylonica, Pollinia	16	65
ceylonica s. sp., Hemichionaspis	12	12
ceylonicus	16	38
chelonioides	16	68
chenopodii	16	55
chilina	16	56
chilopsidis	16	57
chinensis	16	58
Chionaspis	12	10
	16	48, 58, 68, 89
chionaspiformis	16	68, 91
chionaspitiformis	16	91
clusiæ	16	56
chitinosus	16	71
chiton	16	45, 66
cholodkovskyi	16	38
Chrysomphalus	12	15
	16	58, 70, 93
cinerea	16	34, 58
cingala	12	18
cinnamomi, Chionaspis	12	10
cinnamomi mangiferæ, Aulacaspis	16	90
Cissococcus (?)	16	85
cistuloides	12	15
citri coleorum	16	40
citricola	16	68

	Technical Series No.	Page.
COCCINÆ	12	6
<i>coccineus</i>	16	43, 66, 87, 95
<i>coccophylæ</i>	16	64
<i>coccura</i>	16	47
<i>Coccus</i>	16	39
<i>cockerelli</i>	12	8
<i>cockerelliana</i>	16	45, 67, 88
<i>cocotiphagus</i>	12	4
<i>coffeæ</i>	12	16
<i>colemani</i>	16	51
<i>coleurum</i>	16	40, 84
<i>colimensis</i>	16	39
<i>coloradensis</i>	12	40
<i>comari</i>	12	2
<i>comperei</i>	16	58
CONCHASPINÆ	12	7
<i>Conchaspis</i>	16	39
<i>conchiformis</i>	16	52
<i>concolor, Physokermes</i>	12	3
<i>concolor, Aonidomytilus</i>	12	35
<i>coniferarum shastæ</i>	12	3
<i>conservans</i>	16	68
<i>cordaliæ</i>	12	10
<i>cordiæ</i>	12	16
<i>coronatum</i>	12	13
<i>coronifera</i>	16	69
<i>corrugata</i>	16	87
<i>corsa</i>	12	11
<i>corticalis s. sp.</i>	16	11
<i>corticis-pini</i>	12	17
<i>corticoides s. sp.</i>	12	12
<i>coryli</i>	16	37
<i>coulteri</i>	16	52
<i>coursetiæ</i>	12	46
<i>crenulata</i>	12	6
<i>cristata s. sp., Icerya</i>	16	52
<i>cristata, Pseudoparlatoria</i>	16	14
<i>crotonis</i>	12	34
<i>crudæ</i>	16	71
<i>crustuliforme</i>	12	5
<i>cryphæformis</i>	16	86
<i>Cryptaspidiotus</i>	16	72
<i>Cryptaspidus</i>	16	67
<i>Crypthemichionaspis</i>	16	48
<i>Cryptodiaspis s. sg.</i>	16	71, 92
<i>Cryptoparlatoria</i>	12	91
<i>Cryptophyllaspis</i>	16	91
	12	69
	16	18
	16	95
	12	15

	Technical Series No.	Page.
Otenochiton.....	12	7
cupressi, Leucaspis.....	12	12
cupressi, Pseudococcus.....	16	40
cupressi, Sphærococcus.....	16	85
cuculis.....	12	13
curculiginis.....	12	15
curtisi.....	12	8
cycliger.....	16	40
DACTYLOPIINÆ.....	12	3
	16	35, 62, 84
Dactylopius.....	16	38
<i>Dactylopius</i>	16	64, 86
dealbata s. sp.....	12	4
decorella theæ.....	16	43
decurvata.....	12	11
densiflora.....	16	52
dentata.....	16	70
dentilobis.....	16	68
destefanni.....	16	57
Diaspidiotus s. g.....	12	13
	16	51, 92, 94
diaspiformis.....	16	51
DIASPINÆ.....	12	10
	16	48, 68, 89
Diaspis.....	12	11
	16	48, 68, 90
dimorphus.....	16	64
Dinaspis.....	16	95
discrepans.....	12	9
distorta.....	16	67
diversipes.....	12	8
diversispinus.....	16	85
donisthorpei.....	16	42
draperi.....	16	38
dudleyi.....	12	5
ebeni.....	12	16
echinata.....	12	16
eglandulosus.....	16	52
ehrhorni.....	12	13
elæidis.....	16	52
elastica.....	12	4
elegans.....	16	89
elongatus, Pseudococcus.....	12	5
	16	40, 58
elongatus s. sp., Cryptophyllaspis.....	12	15
ephedræ var., Pseudococcus.....	12	5
ephedræ, Leucaspis.....	16	50
ephedræ, Parlatoria.....	16	95
epigææ.....	16	52
eremobius.....	16	36
ericicola.....	16	48
Eriococcus.....	12	3, 4
	16	37, 85

	Technical Series No.	Page.
erigoni.....	16	85
Eriopeltis.....	12	7
etrusca.....	16	48
Eucalymnatus.....	12	7
<i>Eulecanium</i>	12	8
	16	89
Euparlatoria s. g.....	12	18
Euphilippia.....	16	44
euphorbiæ.....	16	93
Evaspidiotus.....	12	14
	16	52
exiguum.....	16	62
expansum javanicum.....	12	9
expansum metallicum.....	12	9
expansum quadratum.....	12	9
expansum rotundum.....	12	9
fabianæ.....	16	94
Fagisuga.....	16	35
fasciata.....	16	94
Fernaldella.....	16	58
	12	16
<i>Fernaldiella</i>	16	58
ferox.....	16	54
festiva.....	16	34
fici, Hemichionaspis.....	16	49
fici, Tachardia.....	12	6
ficifoliæ ulmicola.....	16	57
ficifolii.....	12	17
ficus.....	16	65
Fiorinia.....	12	13
	16	50, 91
fissidens, Aspidiotus.....	16	69
fissidens pluridentatus, Aspidiotus.....	16	93
fissus.....	16	93
flavociliatum.....	16	62
florenciæ.....	12	13
fluminensis.....	12	3
folsomi.....	12	9
formicarii.....	16	42
formicarius.....	16	64
formicarum.....	16	39
formosa.....	12	11
frenchii.....	16	36
frontalis.....	12	8
fukayai.....	16	67
Furcaspis.....	16	54
furcræicola.....	16	93
fuscum.....	16	46
galapagoensis.....	12	3
galeatus.....	16	88
gallicola.....	16	37
gilensis s. sp.....	16	37

	Technical Series No.	Page.
glandi.....	16	46, 72
glandulosa.....	16	56, 91
gleditsiæ.....	12	11
Globulicoccus s. g.....	16	46
glomerella.....	12	6
gœthei.....	12	6
gorodetskia.....	16	35
gossypii s. sp.....	16	49
gowdeyi.....	16	88
grabhami.....	12	6
gracilis.....	16	54
graminicola.....	16	39
graminis.....	16	40
graminis, Odonaspis.....	16	55
grandulifera.....	16	87
greeni, Asterolecanium.....	12	3
greeni, Pseudaonidia.....	16	54
greeni, Parlatoria.....	16	58
gryphæformis.....	16	48
Gymnaspis.....	12	16
Gymnococcus.....	16	56, 70
gymnospori.....	16	85
gymnosporiæ.....	16	45
gymnosporiæ.....	16	93
hamata.....	16	69
hastata.....	16	72, 95
Heliococcus.....	16	86
Hemiberlesia s. g.....	12	13
Hemichionaspis.....	16	52, 92
Hemichionaspis.....	12	12
Hemichionaspis.....	16	49, 91
Hemilecanium.....	16	47, 67, 72
hempeli.....	12	2
herculeanus.....	16	52
hesperidum javanensis.....	16	45
hibisci.....	16	36
himalayensis.....	16	36
hirsuta.....	16	51
hirsutus.....	16	39
hordei.....	12	4
howardi.....	16	37
Houardia.....	16	47
Howardia.....	12	11
Howardia.....	16	47
hymenanthæræ.....	12	17
hypogea.....	16	42
Icerya.....	12	2
Icerya.....	16	34, 58, 84
iceryoides.....	16	39
ichesii.....	16	95
imbricans.....	16	72
immaculatus.....	12	13
incisus.....	12	8

	Technical Series No.	Page.
inday.....	16	48
indentata.....	12	16
indiaë-orientalis.....	16	69, 91
indica, Antonina.....	16	43
indica, Leucaspis.....	16	50
indicus.....	16	63
inflatum.....	12	8
Inglisia.....	16	68, 88
innumerabilis betheli.....	12	6
inquilina.....	16	42
insolens.....	12	10
insolitus.....	16	39
intermedia victoriaë.....	12	17
irregularis.....	16	88
Ischnaspis.....	16	71, 95
ixoræ.....	16	66
jacksoni.....	16	44
japonica, Ripersia.....	16	42
japonica, Lichtensia.....	16	68
javanensis, Aonidia.....	12	16
javanensis, Opuntiaspis.....	12	18
javanensis s. sp., Coccus.....	16	45
javanensis, Aulacaspis.....	16	49
javanica.....	16	49
javanicum s. sp.....	12	9
junctiloba.....	16	54
juniperi, Pseudococcus.....	16	40
juniperi, Fiorinia.....	16	51
kamerunensis.....	16	72
kamerunica, Pseudaonidia.....	16	54
kamerunicus, Pseudaonidia.....	16	54
kelloggi, Leucaspis.....	12	12
kelloggi, Ripersiella.....	16	41
kermanensis.....	12	12
Kermes.....	16	36, 85
kinshinensis.....	16	68
koebelei.....	16	85
koebeli.....	16	66
kunoensis.....	16	46, 72
kuwacola.....	16	44
kuwanæ.....	12	4
labiatarum.....	16	52
Lachnodiella.....	16	40, 86
lagerstroemiæ.....	16	37
lahillei, Ceroplastes.....	16	65
lahillei, Gymnococcus.....	16	85
lahillei, Dinaspis.....	16	95
lanceolatum.....	16	62
larreæ s. sp., Icerya.....	12	2
	16	58
larreæ, Protargonia.....	16	94
latialis.....	16	37
lauretorum.....	16	39

	Technical Series No.	Page.
Lecanium.....	12	10
	16	46, 67, 72, 88, 89
Lecaniodiaspis.....	16	36, 84
Lecanopsis.....	16	47
lectularius.....	16	53
ledi.....	16	86
Lefroyia.....	16	38
leonardi.....	12	12
Lepidosaphes.....	12	16
	16	56, 71, 94
Leucaspis.....	12	12
	16	50, 69, 91
leucaspis.....	12	18
Leucodiaspis.....	16	50, 69
libera.....	16	42
Lichtensia.....	16	68
lidgetti.....	16	91
lilacinus.....	12	5
limnanthemii.....	12	10
limuloides.....	16	69
<i>lineare</i>	16	35, 62
littoralis tonilensis.....	12	2
lüstneri.....	12	9
loewi.....	16	50
<i>lobulata</i>	12	11
<i>longa</i> s. sp.....	16	62
<i>longa</i> , Aonidia.....	16	92
longipes.....	16	41
longiseta.....	16	88
longisetosa, Tachardia.....	16	87
longisetosa, Icerya.....	16	84
longispina.....	16	89
longivalvata.....	16	66
longula.....	16	57
Lophococcus.....	16	84
lounsburyi.....	16	54
lutea.....	16	90
Luzulaspis.....	16	87
lycii.....	16	87
macrocarpæ.....	16	35
Macrocerococcus.....	16	38
macroprocta.....	16	51
madagascariensis s. sp.....	16	41
mæandrius.....	16	69
magna.....	16	54
malaboda.....	16	63
malleolus.....	12	15
	16	58
mammillaris.....	16	93
mangiferæ, Parlatoria.....	16	58
mangiferæ s. sp., Monophlebus.....	12	2

	Technical Series No.	Page.
<i>mangiferæ</i> s. sp., <i>Aulacaspis</i>	16	90
<i>manni</i>	16	48
<i>Margarodes</i>	16	34
MARGARODINÆ.....	12	2
	16	34
<i>marsupialis</i>	12	8
<i>martelli</i>	16	35
<i>Matsucoccus</i>	16	34
<i>matsumuræ</i>	16	34
<i>matumuræ</i>	12	2
<i>maxima</i>	12	6
<i>maximus</i>	16	83
<i>mcgregori</i>	16	57
<i>mediterraneus</i> , <i>Margarodes</i>	16	34
<i>mediterraneus</i> , <i>Cryptaspidiotus</i>	16	71
<i>Melanaspis</i> s. g.....	16	70, 93
<i>mendozinus</i>	16	86
<i>meridionalis</i>	16	72
<i>Mesolecanium</i>	12	8
	16	45
<i>metallicum</i> s. sp.....	12	9
<i>meyeri</i>	16	53
<i>micropori</i>	16	48
<i>Micrococcus</i>	16	42
<i>miliaris longa</i>	16	62
<i>miliaris robusta</i>	16	35
<i>Mimosicerya</i> , n. sec. <i>Icerya</i>	12	2
<i>minima</i>	16	49
<i>minor</i> , <i>Icerya</i>	16	34
<i>minor</i> s. sp., <i>Asterolecanium</i>	16	63
<i>minutus</i>	16	55
<i>mirabilis tricornis</i>	16	84
<i>mirmecophila</i>	16	47
<i>missionum</i>	16	64
<i>mittelli</i>	16	53
<i>miyasakii</i>	16	36
MONOPHLEBINÆ.....	12	2
	16	33, 61, 83
<i>Monophlebus</i>	12	2
	16	33, 61, 83
<i>montanus</i>	16	46
<i>montonæ</i>	16	47
<i>moreirai</i>	12	14
<i>mori</i> , <i>Aspidiotus</i>	16	69
<i>mori somereni</i> , <i>Lecanium</i>	16	67
<i>muiri</i>	16	67
<i>multipora</i> , <i>Lepidosaphes</i>	12	17
<i>multipora</i> s. sp., <i>Fiorinia</i>	16	91
<i>multispinosus</i>	16	33
<i>muratæ</i>	16	36
<i>myrmecarius</i>	16	41
<i>myrtus</i>	12	18

	Technical Series No.	Page.
mytilaspiiformis.....	16	90
Mytilaspis.....	12	17
	16	56, 94
Mytilella.....	12	16
nanus.....	12	5
neo-caledonica.....	16	91
Neolecanium.....	16	67
nicotianæ.....	16	45
nigra.....	16	91
nishigaharæ.....	16	47
nucum.....	16	91
nudata.....	16	90
nyasæ.....	16	88
oahuensis.....	16	85
obtusus.....	16	86
obscurus.....	16	41
occidentalis subalpina.....	16	66
occultus elongatus.....	12	15
oceanica.....	16	54
ocellata.....	16	57
ochnaceæ.....	16	67
octocaudata s. sp.....	16	33
odinæ, Fiorinia.....	16	51
odinæ multipora, Fiorinia.....	16	91
Odonaspis.....	12	16
	16	55
ohioensis.....	12	14
okadæ.....	16	34
oleæ, Phenacoccus.....	16	64
oleæ, Lepidosaphes.....	16	56
olivacea.....	12	3
olivina.....	16	44
opacus s. sp.....	12	7
Opisthoscelis (?).....	16	84
Opuntiaspis.....	12	18
orientalis.....	16	44
orlandi.....	16	49
ornatus.....	16	63
Orthezia.....	12	3
	16	35, 84
ORTHEZIINÆ.....	12	2
	16	35, 84
ortholobis bruneri.....	12	11
oryzæ.....	16	42
oxycoccus.....	12	14
Palæococcus.....	16	34
Palæolecanium.....	16	46
pallidus.....	16	61
paradoxa.....	16	92
Paralecanium.....	12	9
	16	47
parcispinosus.....	16	85
parlatorioides.....	16	95

	Technical Series No.	Page.
Parlatoria.....	12	18
parlatoriæ.....	16	58, 72, 95
Parthenolecanium.....	12	18
parva.....	16	46
pasaniæ.....	16	90
pectinatus.....	16	62
penzigi.....	16	70
perditulum.....	16	49
pedronis.....	12	45
penicillata.....	12	15
peradeniyense.....	12	16
percerosus.....	12	9
pergandii phyllanthi.....	16	86
perniciosus.....	12	18
perplexa.....	16	65
Phenacaspis.....	16	56
Phenacobryum.....	12	12
Phenacoccus.....	16	90
philippina s. sp.....	12	3
phragmitis.....	12	4
phyllanthi, Targionia.....	16	38, 64
phyllanthi s. sp.....	12	7
Physokermes.....	16	43
picea.....	12	16
piceus.....	12	18
pinicola.....	12	10
Pinnaspis.....	16	56
piperis.....	12	14
pisai.....	16	49
pistaciæ.....	16	57
plana.....	12	14
plucheæ.....	16	50
pluridentatus s. sp.....	16	87
Pollinia.....	16	44
polygonata.....	12	93
Polyocellaria.....	16	65
popularum.....	12	6
portoricensis.....	12	2
privignus.....	16	53
prominens s. sp.....	16	70
propsimus.....	16	53
prosopidis.....	16	62
Protargionia.....	16	55
proteus.....	16	84
prunastri.....	12	94
Pseudaonidia.....	12	18
pseudaspidiotus.....	16	46
Pseudococcus.....	12	15
pseudococcus.....	16	54
pseudococcus.....	12	18
pseudococcus.....	12	5
pseudococcus.....	16	40, 58, 86

	Technical Series No.	Page.
pseudonigrum.....	16	67
Pseudoparlatoria.....	16	56, 71
pseudospinosus.....	12	14
psidii, Saissetia.....	12	10
psidii philippina, Pulvinaria.....	12	7
pudibundum.....	16	62
pugionifera.....	16	68
pulcher.....	16	34
pulchra.....	12	16
pulchrum.....	12	9
	16	46, 72
Pulvinaria.....	12	6
	16	43, 66, 87
punctulifera.....	12	10
pusilla, Aonidia.....	12	16
pusilla, Actenaspis.....	16	50
pustulans, Sphærococcus.....	12	4
pustulans, Aspidiotus.....	12	14
pustulans sambuci, Asterolecanium.....	12	3
pustulans seychellarum, Asterolecanium.....	16	62
pyri.....	16	58
quadratum s. sp.....	12	9
quadriclavatus.....	12	15
quadrilineatus.....	16	65
	16	66
quercus gilensis.....	16	37
ramonæ.....	16	39
rattani.....	16	36
recurvatum.....	16	67
regularis.....	16	90
rehi, Asterolecanium.....	12	3
rehi, Pulvinaria.....	12	7
replicatus.....	16	70
resinatum.....	16	67
reticulatus.....	16	93
<i>rhizophilla</i>	16	65
Rhopaloaspis.....	12	11, 13
riccæ.....	12	11, 13
rileyi larreæ.....	12	2
	16	58
Ripersia.....	16	42, 65, 87
Ripersiella.....	16	41, 65
ripersioides.....	12	4
riveræ.....	12	14
	16	58
robusta s. sp.....	16	35
rombica.....	16	49
rosæ australis.....	16	34
roseus.....	16	64
rotundum s. sp.....	12	9
rubellum.....	16	46, 72
rubrocomatum.....	16	63

	Technical Series No.	Page.
rubrolineata.....	16	51
rubrovittatus.....	12	17
ruthæ.....	16	56
saccharifolii.....	16	41
Saissetia.....	12	9
	16	67, 89
salinus.....	16	85
sambuci s. sp.....	12	3
samoana.....	16	93
sanguineus.....	12	7
sardinia.....	16	42
sassceri.....	16	68
schrottkyi.....	12	7
schultzei.....	16	94
Selenaspilus s. sp.....	16	54, 93
sericeum.....	16	46
serratus.....	12	7
serrifrons.....	16	57
seurati.....	16	70
seychellarum s. sp., Asterolecanium.....	16	62
seychellarum cristata, Icerya.....	16	34
shastæ.....	12	13
shastensis.....	16	85
sideroxylium.....	16	67
signiferus.....	12	8
silvatica.....	16	54
silvestrii, Micrococcus.....	16	42
silvestri, Saissetia.....	16	89
similis.....	16	43
simplex dealbata.....	12	4
singularis.....	16	66
sjöstedti, Stictococcus.....	12	8
sjöstedti, Monophlebus.....	16	61
smithii.....	16	65
Solenococcus.....	16	36
Solenophora.....	16	36
solidaginis.....	12	3
somereni s. sp.....	16	67
sorbusæ s. sp.....	12	7
sordidus.....	12	3
spathulata.....	16	95
Sphærococcus.....	12	4
	16	38, 85
Sphærolecanium.....	16	46
spiniger.....	16	70
spinomarginata.....	12	16
spinosissima.....	16	70
spinulosa.....	16	87
squamosus.....	12	11
stebbingii mangiferæ.....	12	2
stebbingi octocaudata.....	16	33
Steingelia.....	16	35

	Technical Series No.	Page.
Stictococcus.....	12	7
	16	38, 64
Stigmacoccus.....	16	83
<i>stilosa</i>	16	69
Stotzia.....	16	44
<i>striata</i>	16	44
<i>strobilanthi</i>	12	12
<i>subalpina</i> s. sp.....	16	66
<i>subandina</i>	16	84
<i>subcorticalis</i>	12	11
<i>suberi</i> s. sp.....	16	55
<i>subfervens</i>	12	14
<i>subnudata</i>	16	90
<i>subrotundus</i>	16	88
<i>subtessellatus</i>	12	7
<i>subrubescens corticoides</i>	12	14
<i>subsphæricus</i>	16	88
<i>substriata</i>	16	68
<i>superbus</i>	16	38
<i>sylvatica</i>	12	11
Tachardia.....	12	6
	16	43, 87
TACHARDIINÆ.....	12	6
	16	43, 87
<i>takæ</i>	16	41
Takahashia.....	16	68
<i>tamarindus</i>	16	33
<i>tangana</i>	16	90
<i>taorensis</i>	16	94
<i>taprobanus</i>	12	15
<i>Targionia</i> s. g.....	12	14, 16
	16	55, 71, 94
<i>targioniopsis</i>	16	92
<i>tayabanus</i> , <i>Aspidiotus</i>	12	15
<i>tayabanus</i> , <i>Pseudococcus</i>	12	5
<i>taxifoliæ</i>	12	10
<i>taxus</i>	16	55
<i>tectarius</i>	16	94
<i>tenebricophilum</i>	12	10
<i>tenuior</i>	16	72
<i>tenuissimum</i>	16	63
<i>tenuitectus</i>	16	44
<i>tenuivalvatum</i>	16	89
<i>theæ</i> , <i>Euparlatoria</i>	12	18
<i>theæ</i> s. sp., <i>Tachardia</i>	16	43
<i>theæ ceylonica</i> , <i>Hemichionaspis</i>	12	12
<i>theæcola</i>	16	41
<i>theobromæ</i> , <i>Palæococcus</i>	16	34
<i>theobromæ</i> , <i>Ceroplastes</i>	16	45
<i>theobromæ</i> , <i>Hemilecanium</i>	16	47, 72
<i>thespesiæ</i> , <i>Asterolecanium</i>	16	63
<i>thespesiæ</i> , <i>Pulvinaria</i>	16	66
<i>tinerfensis</i>	16	94

	Technical Series No.	Page.
tonilensis s. sp., <i>Icerya</i>	12	2
	16	58
townsendi, <i>Monophlebulus</i>	12	2
townsendi, <i>Hemichionaspis</i>	12	12
trabuti.....	16	53
Trabutina.....	12	4
transcaspensis.....	16	53
travancorensis.....	16	95
tremæ.....	16	89
tricarinatus.....	12	4
triglandulosus.....	16	55
triloba.....	16	35
Trionymus.....	12	4
	16	58, 86
trogodytes.....	16	47
Trulliflorinia.....	16	50
tsugæ.....	16	94
tubercularis.....	16	49
<i>tuberculatus</i>	16	45, 67
tumida.....	16	51
tumidum.....	16	63
tyleri.....	12	7
uberifera.....	16	95
udagamæ.....	16	63
ugandæ.....	16	88
ulmicola s. sp.....	16	57
Ultracœlostoma s. g.....	12	2
undulatus.....	16	70
ungulata.....	12	17
unicolor.....	16	58
uniloba.....	16	72
unita.....	16	91
uvariæ.....	16	45
vagabundus.....	12	5
varians.....	16	94
variegatus corticalis.....	16	37
variolosum minor.....	16	63
varipes.....	16	84
vastus.....	16	37
verrucosæ.....	12	7
virescens.....	16	66
virgatus var., <i>Pseudococcus</i>	12	5
virgatus madagascariensis, <i>Pseudococcus</i>	16	41
victoriæ.....	12	17
vinsonioides.....	16	88
viridis.....	16	92
vitis arbutus, <i>Targionia</i>	16	71
vitis opacus, <i>Pulvinaria</i>	12	7
vitis sorbusæ, <i>Pulvinaria</i>	12	7
vitis suberi, <i>Targionia</i>	16	55
vitis verrucosæ, <i>Pulvinaria</i>	12	7
volynicus.....	16	39
vovæ.....	16	41

	Technical Series No.	Page.
vuilleti, Aspidiotus.....	16	53
vuilleti, Ceroplastes.....	16	45
vuilleti, Chionaspis.....	16	48
Walkeriana.....	16	34, 61
Websteriella s. g.....	12	18
wilga.....	12	17
Xylococcus.....	12	2
	16	35
yulupæ.....	16	53
zimmermanni.....	16	83
zonatum.....	12	9

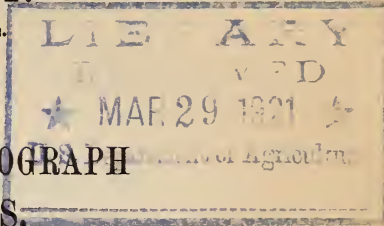
ADDITIONAL COPIES of this publication
 may be procured from the SUPERINTEND-
 ENT OF DOCUMENTS, Government Printing
 Office, Washington, D. C., at 5 cents per copy



782 BT
TECHNICAL SERIES No. 17.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.



CONTRIBUTIONS TOWARD A MONOGRAPH
OF THE SCOLYTID BEETLES.

CONTENTS AND INDEX.

ISSUED FEBRUARY 19, 1921.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1921.

BUREAU OF ENTOMOLOGY.

L. O. HOWARD, *Entomologist and Chief of Bureau.*
C. L. MARLATT, *Entomologist and Assistant Chief of Bureau.*
E. B. O'LEARY, *Assistant to Chief.*
A. J. LEISTER, *Chief Clerk.*
ROLLA P. CURRIE, *Editor.*
MABEL COLCORD, *Librarian.*

W. D. HUNTER, *in charge of southern field-crop insect investigations.*
W. R. WALTON, *in charge of cereal and forage insect investigations.*
A. L. QUAINANCE, *in charge of fruit insect investigations.*
F. H. CHITTENDEN, *in charge of truck-crop insect investigations.*
E. A. BACK, *in charge of stored-product insect investigations.*
A. D. HOPKINS, *in charge of forest insect investigations.*
E. F. PHILLIPS, *in charge of investigations in bee culture.*
A. F. BURGESS, *in charge of gipsy moth and brown-tail moth investigations.*

FOREST INSECT INVESTIGATIONS.

A. D. HOPKINS, *Forest Entomologist in Charge.*

J. M. MILLER, *assistant forest entomologist*; H. E. BURKE, W. D. EDMONSTON, T. E. SNYDER, J. C. EVENDEN, *specialists in forest entomology*; S. A. ROHWER, *specialist in forest Hymenoptera*; A. G. BOVING, *expert*; CARL HEINRICH, *specialist in forest Lepidoptera*; WILLIAM MIDDLETON, RAYMOND A. ST. GEORGE, J. H. POLLOCK, *scientific assistants*; J. E. PATTERSON, W. E. GLENDINNING, GEORGE HOFER, *entomological rangers*; P. D. HARTMAN, *assistant entomological inspector.*

CONTENTS.

	Page.
THE GENUS DENDROCTONUS..... <i>A. D. Hopkins</i> ..	1
Introductory.....	1
Historical.....	3
Original description of genus.....	4
Translation.....	4
Synonymy.....	5
Revisional notes.....	5
Revised description of genus.....	5
Anatomical.....	5
Nomenclature.....	7
Illustrations.....	9
External characters of the imago.....	9
The head.....	11
The thorax.....	22
Divisions of the thoracic segment.....	23
Elements of the adult thorax.....	26
The prothorax.....	26
The mesothorax.....	28
Mesotergum.....	28
Mesopleura.....	29
Mesosterna.....	30
The metathorax.....	30
Metatergum.....	30
Metapleura.....	34
Metasterna.....	35
The abdomen.....	35
Abdominal tergites.....	36
Abdominal pleurites.....	38
Abdominal sternites.....	38
Spiracles.....	39
The legs.....	39
The wings.....	40
Mesothoracic and metathoracic wings.....	42
Metathoracic or hind wings.....	43
Mesothoracic wings or elytra.....	49
Internal anatomy.....	51
Digestive system.....	52
Secondary sexual characters.....	52
Pupa.....	53
Larva.....	57
External characters.....	57
Digestive system.....	64
Eggs.....	64
Physiological characteristics.....	64

PRELIMINARY CLASSIFICATION OF THE SUPERFAMILY SCOLYTOIDEA—Contd.		Page.
Taxonomy.....		169
Morphological characters.....		169
Superfamily characters.....		169
Family characters.....		170
Subfamily characters.....		170
Generic characters.....		171
The antennæ.....		171
The eyes.....		174
The mouth parts.....		174
Characters in general.....		175
The body.....		175
Form.....		175
Color.....		176
Vestiture.....		176
Sculpture.....		176
Armatures.....		176
Head.....		177
Prothorax.....		177
Mesothorax.....		177
Metathorax.....		178
Legs.....		179
Elytra.....		179
Posterior wings.....		179
Abdominal tergites.....		180
Abdominal spiracles.....		181
Abdominal sternites.....		182
Stridulating accessories.....		182
Internal anatomy.....		183
Digestive system.....		183
Proventriculus.....		183
Reproductive organs.....		184
The reproductive organs of the male.....		184
Posterior elements.....		185
Anterior and median elements.....		190
Variations and combinations of the elements.....		190
Terminology of the reproductive organs.....		192
Classifications based on the reproductive organs.....		194
Secondary sexual characters.....		195
The pupæ.....		196
The larvæ.....		197
The eggs.....		197
The embryo.....		197
Physiological characteristics.....		198
General habits.....		198
Classification according to habits.....		198
Food habits of the adults.....		199
Food habits of the larvæ.....		199
Pupal habits.....		199
Flight habits.....		200
Social habits.....		200
Galleries.....		201
Terminology of the galleries.....		202

PRELIMINARY CLASSIFICATION OF THE SUPERFAMILY SCOLYTOIDEA—Contd.

Taxonomy—Continued.

Physiological characteristics—Continued.

	Page.
Classification of the galleries.....	204
Egg galleries.....	204
Larval mines.....	204
Types and subtypes of egg galleries.....	205
Relation of types of galleries to the subfamilies and families.....	206
Taxonomic relation between the beetles and their host plants....	207
Part of plant selected by the beetles.....	207
Condition of the plant.....	208
Relation of the species of beetles to the systematic position of their host.....	208
Range of host plants.....	208
Associations of species of beetles and species of plants.....	209
Summary of taxonomic evidence furnished by host relations.....	209
Geographical distribution in its bearing on taxonomy.....	210
Review of taxonomic characters and characteristics.....	211
Morphological characters.....	212
Physiological characteristics.....	213
Correlation of morphological and physiological elements.....	213
Parallel modifications.....	214
Reversals.....	214
Progressive modifications.....	215
Examples of progressive modification.....	215
Statistical taxonomy.....	216
The species.....	216
Varieties, races, etc.....	216
The genus.....	217
Nomenclature.....	218
Types of genera.....	219
Genus <i>Scolytus</i> Geoffroy.....	219
Genus <i>Ips</i> De Geer.....	220
Genus <i>Tomicus</i> Latreille.....	220
Genus <i>Hylastes</i> Erichson.....	221
Genus <i>Cryphalus</i> Erichson.....	221
Genus <i>Hypothenemus</i> Westwood.....	221
Genus <i>Polygraphus</i> Erichson.....	222
Genus <i>Lepisomus</i> Kirby.....	222
Description of a new genus and species.....	222
Preliminary classification of the Superfamily Scolytoidea.....	224
Key to the families.....	224
Division I.....	224
Subdivision A.....	224
Family Ipidae.....	224
Subdivision B.....	225
Family Scolytidae.....	225
Family Scolytoplatypodidae.....	225
Division II.....	225
Subdivision C.....	225
Family Platypodidae.....	225

PRELIMINARY CLASSIFICATION OF THE SUPERFAMILY SCOLYTOIDEA—Contd.

Preliminary classification of the Superfamily Scolytoidea—Continued.

	Page.
Family <i>Ipidae</i> . Key to the subfamilies.....	225
Division I.....	225
Subdivision A.....	225
Subfamily <i>Cryphalinae</i>	225
Subfamily <i>Ipinae</i>	225
Subfamily <i>Corthylinae</i>	225
Subfamily <i>Micracinae</i>	225
Subfamily <i>Webbinae</i>	225
Subdivision B.....	225
Subfamily <i>Xyloctoninae</i>	225
Division II.....	225
Subdivision C.....	225
Subfamily <i>Crypturginae</i>	225
Subfamily <i>Phloeotribinae</i>	225
Subdivision D.....	225
Subfamily <i>Hylesininae</i>	225
Subfamily <i>Phloeoborinae</i>	225
Family <i>Scolytidae</i> . Key to the subfamilies.....	225
Division I.....	225
Subfamily <i>Coptonotinae</i>	225
Division II.....	225
Subdivision A.....	225
Subfamily <i>Hexacolinae</i>	225
Subfamily <i>Bothrosterninae</i>	225
Subfamily <i>Hyorrhynchinae</i>	225
Subdivision B.....	225
Subfamily <i>Camptocerinae</i>	225
Subfamily <i>Scolytinae</i>	225
Family <i>Scolytoplatypodidae</i>	225
Family <i>Platypodidae</i> . Key to the subfamilies.....	225
Division I.....	225
Subfamily <i>Platypodinae</i>	225
Division II.....	225
Subfamily <i>Genyocerinae</i>	225
Subfamily <i>Chapuisinae</i>	225
Position of the principal described genera in the preliminary classification.....	226
Genera described in 1911-12, not included in foregoing list, but here provisionally assigned to the subfamilies.....	227
Genera of doubtful position.....	228
Bibliography.....	229
INDEX.....	233

ILLUSTRATIONS.

PLATES.

	Page.
PLATE I. Classification of the genus <i>Dendroctonus</i> , showing technical and common names and species numbers.....	1
II. Map of world, showing geographical distribution of the genus <i>Dendroctonus</i>	80
III. <i>Dendroctonus</i> adults. Fig. 1.— <i>D. brevicomis</i> . Fig. 2.— <i>D. barberi</i> . Fig. 3.— <i>D. convexifrons</i> . Fig. 4.— <i>D. frontalis</i> . Fig. 5.— <i>D. arizonicus</i> . Fig. 6.— <i>D. mexicanus</i> . Fig. 7.— <i>D. parallelocolitis</i>	164
IV. <i>Dendroctonus</i> adults. Fig. 8.— <i>D. approximatus</i> . Fig. 9.— <i>D. monticolæ</i> . Fig. 10.— <i>D. ponderosæ</i> . Fig. 11.— <i>D. jeffreyi</i>	164
V. <i>Dendroctonus</i> adults. Fig. 12.— <i>D. simplex</i> . Fig. 13.— <i>D. pseudotsugæ</i> . Fig. 14.— <i>D. piceaperda</i> . Fig. 16.— <i>D. borealis</i>	164
VI. <i>Dendroctonus</i> adults. Fig. 17.— <i>D. obesus</i> . Fig. 18.— <i>D. rufipennis</i> . Fig. 20.— <i>D. punctatus</i> . Fig. 21.— <i>D. micans</i>	164
VII. <i>Dendroctonus</i> adults. Fig. 22.— <i>D. terebrans</i> . Fig. 23.— <i>D. valens</i> ..	164
VIII. <i>Dendroctonus</i> larvæ. Fig. 1.— <i>D. brevicomis</i> . Fig. 19.— <i>D. murrayanæ</i> . Fig. 23.— <i>D. valens</i>	164
IX. Figs. 1-18.—Typical tarsi and tibiæ of the subfamilies of Scolytoidea.	170
X. Figs. 1-5a.—Antennæ of typical species of the subfamilies of Scolytoidea.....	170
XI. Figs. 7-10a.—Antennæ of typical species of the subfamilies of Scolytoidea.....	170
XII. Figs. 12-18b.—Antennæ of typical species of the subfamilies of Scolytoidea.....	170
XIII. Figs. 1-9b.—Tibiæ and tarsi of typical species of the subfamilies of Scolytoidea.....	178
XIV. Figs. 10-10b.—Tibiæ and tarsi of typical species of the subfamilies of Scolytoidea.....	178
XV. Figs. 12-15b.—Tibiæ and tarsi of typical species of the subfamilies of Scolytoidea.....	178
XVI. Figs. 16-18b.—Tibiæ and tarsi of typical species of the subfamilies of Scolytoidea.....	178

TEXT FIGURES.

Fig. 1. <i>Dendroctonus valens</i> : Adult, dorsal aspect.....	6
2. <i>Dendroctonus valens</i> : Adult, ventral aspect.....	8
3. <i>Dendroctonus valens</i> : Adult, lateral aspect.....	9
4. <i>Dendroctonus valens</i> : Head, dorsal and lateral aspects.....	12
5. <i>Dendroctonus valens</i> : Head, ventral aspect, and mouth parts.....	13
6. <i>Dendroctonus valens</i> : Head, oral aspect, epistoma, etc.....	14
7. <i>Pterostichus californicus</i> : Head, dorsal and ventral aspects.....	15
8. <i>Pissodes strobi</i> : Head, ventral aspect, and mouth parts.....	16
9. <i>Pissodes strobi</i> : Head, dorsal aspect, and mandibles.....	17
10. <i>Dendroctonus</i> : Epistomata.....	19
11. <i>Dendroctonus</i> : Antennæ.....	20
12. <i>Dendroctonus</i> : Antennæ.....	20
13. <i>Dendroctonus</i> : Antennæ.....	21
14. <i>Dendroctonus valens</i> : Mandible.....	22
15. <i>Dendroctonus</i> : Eyes.....	23
16. <i>Dendroctonus valens</i> : Area of pronotum.....	23
17. <i>Dendroctonus valens</i> : Area of prothorax, ventral aspect.....	24

	Page.
FIG. 18. <i>Dendroctonus valens</i> : Mesothorax, ventral aspect.....	2
19. <i>Dendroctonus valens</i> : Mesotergum and mesopleurum.....	28
20. <i>Dendroctonus valens</i> : Metatergum and metapleurum.....	31
21. <i>Dendroctonus valens</i> : Metatergum, inner aspect.....	33
22. <i>Dendroctonus valens</i> : Abdominal tergites.....	35
23. <i>Dendroctonus valens</i> : Male, abdominal tergites 7 and 8.....	36
24. <i>Dendroctonus valens</i> : Female, abdominal tergites 7 and 8.....	37
25. <i>Dendroctonus valens</i> : Abdominal sternites, ventral and lateral aspects.....	38
26. <i>Dendroctonus valens</i> : Tibia, tarsus, articulation, etc.....	40
27. <i>Dendroctonus</i> : Left tibiæ, dorsal and ventral aspects.....	41
28. <i>Dendroctonus</i> : Left tibiæ, dorsal and ventral aspects.....	42
29. <i>Dendroctonus</i> : Left tibiæ, dorsal and ventral aspects.....	43
30. <i>Dendroctonus valens</i> : Diagram of basal area of hind wing.....	44
31. <i>Dendroctonus valens</i> : Right elytron, ventral aspect.....	45
32. <i>Dendroctonus valens</i> : Basal process of right elytron.....	46
33. <i>Dendroctonus valens</i> : Declivital section of elytra.....	46
34. <i>Dendroctonus valens</i> : Diagram of elytron, showing striæ, interspaces, and tracheæ.....	47
35. <i>Dendroctonus valens</i> : Digestive organs of adult.....	52
36. <i>Dendroctonus valens</i> : Fore intestine, showing details.....	53
37. <i>Dendroctonus valens</i> : Pupa, dorsal, lateral, and ventral aspects.....	54
38. <i>Dendroctonus valens</i> : Pupa, lateral and anal aspects.....	55
39. <i>Dendroctonus valens</i> : Larva, dorsal, lateral, and ventral aspects.....	58
40. <i>Dendroctonus valens</i> : Head of larva.....	59
41. <i>Dendroctonus valens</i> : Mouth parts of larva.....	60
42. <i>Dendroctonus valens</i> : Mandibles of larva.....	63
43. <i>Dendroctonus valens</i> : Digestive organs of larva.....	65
44. <i>Dendroctonus brevicomis</i> : Egg galleries.....	82
45. <i>Dendroctonus brevicomis</i> : Bark showing pupal cells, exit burrows, and pitch tubes.....	83
46. <i>Dendroctonus brevicomis</i> : Distribution map.....	84
47. <i>Dendroctonus barberi</i> : Egg galleries.....	86
48. <i>Dendroctonus barberi</i> : Distribution map.....	87
49. <i>Dendroctonus convexifrons</i> : Egg galleries and larval mines.....	89
50. <i>Dendroctonus convexifrons</i> : Distribution map.....	90
51. <i>Dendroctonus frontalis</i> : Egg galleries and larval mines.....	91
52. <i>Dendroctonus frontalis</i> : Termination of egg galleries.....	92
53. <i>Dendroctonus frontalis</i> : Beginning of egg galleries.....	92
54. <i>Dendroctonus frontalis</i> : Bark showing pitch tubes, etc.....	92
55. <i>Dendroctonus frontalis</i> : Old egg galleries in living trees.....	93
56. <i>Dendroctonus frontalis</i> : Egg gallery in living tree, the resulting wound in process of healing.....	93
57. <i>Dendroctonus frontalis</i> : Distribution map.....	94
58. <i>Dendroctonus arizonicus</i> : Distribution map.....	97
59. <i>Dendroctonus mexicanus</i> : Section of egg galleries.....	98
60. <i>Dendroctonus mexicanus</i> : Distribution map.....	99
61. <i>Dendroctonus parallelöcollis</i> : Section of egg gallery.....	100
62. <i>Dendroctonus parallelöcollis</i> : Distribution map.....	101
63. <i>Dendroctonus approximatus</i> : Single egg gallery.....	102
64. <i>Dendroctonus approximatus</i> : Egg galleries.....	103
65. <i>Dendroctonus approximatus</i> : Distribution map.....	104
66. <i>Dendroctonus monticolæ</i> : Egg galleries and larval mines in bark.....	107

	Page
Fig. 67. <i>Dendroctonus monticolæ</i> : Egg galleries and larval mines grooved in surface of wood.....	108
68. <i>Dendroctonus monticolæ</i> : Distribution map.....	109
69. <i>Dendroctonus ponderosæ</i> : Egg galleries and larval mines.....	112
70. <i>Dendroctonus ponderosæ</i> : Tree with bark removed, showing egg galleries and marked on surface of wood.....	113
71. <i>Dendroctonus ponderosæ</i> : Distribution map.....	114
72. <i>Dendroctonus jeffreyi</i> : Distribution map.....	116
73. <i>Dendroctonus simplex</i> : Egg galleries and larval mines.....	119
74. <i>Dendroctonus simplex</i> : Distribution map.....	120
75. <i>Dendroctonus pseudotsugæ</i> : Egg galleries and larval mines.....	122
76. <i>Dendroctonus pseudotsugæ</i> : Egg gallery and larval mines.....	123
77. <i>Dendroctonus pseudotsugæ</i> : Section of log with bark removed, showing brood galleries marked and grooved on surface of wood.....	124
78. <i>Dendroctonus pseudotsugæ</i> : Distribution map.....	125
79. <i>Dendroctonus piceaperda</i> : Egg gallery and larval mines.....	128
80. <i>Dendroctonus piceaperda</i> : Distribution map.....	129
81. <i>Dendroctonus engelmanni</i> : Egg gallery and eggs in living bark.....	132
82. <i>Dendroctonus engelmanni</i> : Distribution map.....	133
83. <i>Dendroctonus borealis</i> : Distribution map.....	134
84. <i>Dendroctonus obesus</i> : Distribution map.....	137
85. <i>Dendroctonus rufipennis</i> : Distribution map.....	140
86. <i>Dendroctonus murrayanæ</i> : Distribution map.....	141
87. <i>Dendroctonus punctatus</i> : Distribution map.....	143
88. <i>Dendroctonus micans</i> : Egg galleries and larval chamber.....	145
89. <i>Dendroctonus micans</i> : Distribution map.....	146
90. <i>Dendroctonus terebrans</i> : Distribution map.....	150
91. <i>Dendroctonus valens</i> : Egg galleries and larval chamber.....	152
92. <i>Dendroctonus valens</i> : Work in bark at base of stump.....	153
93. <i>Dendroctonus valens</i> : Basal work in living tree resulting from primary injury by this species.....	154
94. <i>Dendroctonus valens</i> : Distribution map.....	155
95. <i>Dendroctonus adjunctus</i> : Distribution map.....	158
96. The antenna in scolytoid beetles: Diagram and terminology.....	172
97. Abnormalities in the antennal funicle of <i>Xyleborus tachygraphus</i>	173
98. <i>Ips emarginatus</i> : Proventricular plate.....	183
99. <i>Scolytus scolytus</i> : Proventricular plate.....	183
100. <i>Crossotarsus lecontei</i> : Proventricular plate.....	183
101. <i>Dendroctonus valens</i> : Membranous and nonchitinous elements of male reproductive organs.....	184
102. <i>Xyleborus saxeseni</i> : Chitinous elements of male reproductive organs..	184
103. <i>Ips emarginatus</i> : Chitinous elements of male reproductive organs..	185
104. <i>Pityophthorus</i> sp.: Chitinous elements of male reproductive organs..	186
105. <i>Pityophthorus bellus</i> : End plates and seminal rod of male reproductive organs.....	186
106. <i>Micracis suturalis</i> : Posterior elements of male reproductive organs...	186
107. <i>Dendroctonus valens</i> : Posterior elements of male reproductive organs.	187
108. <i>Scolytus rugulosus</i> : Posterior elements of male reproductive organs.	189
109. <i>Scolytus quadrispinosus</i> : Posterior elements of male reproductive organs.....	189
110. <i>Crossotarsus lecontei</i> : Posterior elements of male reproductive organs.....	191
111. <i>Dendroctonus valens</i> : Female reproductive organs.....	194
112. Classification of galleries of Scolytoidea.....	205

ERRATA.

- Page x, line 23, for *Zimmerman* read *Zimmermann*.
Page 1, first paragraph, second line, for 91 read 1902.
Page 3, line 12, for *junipiri* read *juniperi*; line 14, for *Zimmerman* read *Zimmermann*.
Page 40, legend to figure 26, for *left* read *right*, throughout; legend to figure 26, line 6, for *sinistral* read *dextral*, for *dextral* read *sinistral*.
Page 41, legend to figure 27, line 1, for *left* read *right*.
Page 42, legend to figure 28, line 1, for *left* read *right*.
Page 43, legend to figure 43, line 1, for *left* read *right*.
Page 59, legend to figure 40, line 4, for *gular* read *entogular*; line 5, for *gular* read *genal*, in both places.
Page 60, legend to figure 41, line 4, for *labial* read *labral*.
Page 61, line 18, after *areas* insert (*fig. 40, m*).
Page 69, line 30, for *distinctly* read *strongly*.
Page 80, line 43, for *Zimmerman* read *Zimmermann*.
Page 90, line 15, for *Zimmerman* read *Zimmermann*.
Page 95, line 7, for *Zimmerman* read *Zimmermann*, after *type* omit comma; line 35, for *Zimmerman* read *Zimmermann*.
Page 98, line 38, for *lejophilla* read *lejophylla*.
Page 101, line 3, for *lejophilla* read *lejophylla*.
Page 124, line 21, for 2289 read 2298.
Page 146, line 18, for *Quairière* read *Quairière*.
Page 148, line 19-20, for *Zimmerman* read *Zimmermann*.
Page 150, line 13, for *Zimmerman* read *Zimmermann*.
Page 154, line 11, for *Cabon* read *Cobon*.
Page 156, line 30, for *Zimmerman* read *Zimmermann*.
Page 157, line 1, for *Zimmerman* read *Zimmermann*.
Page 160, line 19, for *XV* read *II*; line 20, for *Zimmerman* read *Zimmermann*; line 21, for *XV* read *II*, for 150 read 149.
Page 164, line 28, for 1906b read 1905.
Page 179, line 8, for *X* read *IX*.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF ENTOMOLOGY,

Washington, D. C., March 16, 1909.

SIR: I have the honor to transmit herewith manuscript of the first part of a bulletin of the technical series to be entitled "Contributions toward a Monograph of the Scolytid Beetles." This family of beetles includes some of the most important enemies of North American forests, as well as of crude forest products, and therefore must demand special attention in future systematic and economic investigations by this bureau and by forest entomologists connected with other public institutions and private enterprises. It is necessary, as a foundation for such work, that the heretofore described species should be accurately identified, that those new to science should be described, and that this information, together with other systematic data based on original research by this bureau, should be made available in the form of contributions to a monograph. This work has been undertaken by Dr. Hopkins, of this bureau, and the greater part of the collecting and working up of the material has been completed. Delay in publication will be avoided, and it is believed that the published results will be more useful in future systematic and economic investigation if the results relating to groups of species which have similar characters and characteristics and similar relations to given economic problems are published as parts of a bulletin rather than in one undivided publication. These technical parts are to be supplemented in a like manner by parts of a bulletin of the regular series, giving information of immediate practical importance to the forester and owners and managers of private forests.

The first part of this bulletin is entitled "The Genus *Dendroctonus*." It embodies the results of extensive systematic investigations of the genus, carried on by Dr. Hopkins during the past 17 years, and is of especial interest and importance from the fact that it deals with a small group of beetles which are the most destructive enemies of the principal coniferous forest trees of North America.

The discussions and illustrations relating to anatomical and technical details are necessary as a basis for the correct description, interpretation, and recognition of generic and specific characters, on which depends the future success of economic work on the scolytid beetles,

and as aids in the preparation of technical and economic contributions to the monograph.

I recommend the publication of this paper as Part I of Technical Series, No. 17, of the Bureau of Entomology.

Respectfully,

L. O. HOWARD,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

I N D E X .

	Page.
<i>Abies</i> —	
host of <i>Cryphalus</i>	208
host of <i>Dendroctonus micans</i>	145
host of <i>Scolytus</i>	209
<i>Abies concolor</i> , host of <i>Dendroctonus valens</i>	156
<i>Alnus</i> , host of <i>Trypophlæus</i>	209
<i>Amphicranus</i> , armature.....	176
<i>Amphicranus fastigatus</i> , armature.....	177
<i>Anisandrus dispar</i> , paired species.....	211
<i>Anisandrus pyri</i> , paired species.....	211
<i>Aphanarthrum</i> , distribution.....	210
<i>Apion</i> , head.....	177
Apionidæ, position in Rhynchophora.....	167
<i>Balaninus</i> , head.....	177
<i>Betula</i> , host of <i>Scolytus</i>	209
<i>Blastophagus</i> , <i>Dendroctonus piniperda</i> and <i>D. minor</i> referred to it.....	3
(<i>Bostrichus</i>) <i>micans</i> —	
included in <i>Dendroctonus</i>	3
synonym of <i>Dendroctonus micans</i>	5
<i>Bostrichus scolytus</i> , described by Fabricius.....	220
Bothrosterninæ, in key to subfamilies.....	225
<i>Cactopinus</i> —	
armature.....	176
epistoma.....	175
Camptocerinæ, in key to subfamilies.....	225
Carabidæ, position in Coleoptera.....	167
<i>Carphoborus</i> —	
connecting galleries.....	203
<i>Dendroctonus minimus</i> referred to this genus.....	3
eggs.....	197
reproductive organs.....	195
<i>Celtis</i> , host of <i>Scolytus</i>	209
Chapuisinæ, in key to subfamilies.....	225
<i>Coccotrypes</i> , secondary sexual characters.....	195
Coptonotinæ, in key to subfamilies.....	225
Corthylinæ, in key to subfamilies.....	224
<i>Corthylus</i> —	
general habits.....	198
host plants.....	209
<i>Cosmoderes</i> , head.....	177
<i>Crossotarsus</i> —	
food habits.....	199
larvæ.....	197
reproductive organs.....	188, 190
social gallery.....	202
<i>Crossotarsus lecontei</i> , probably similar food habits to <i>Webbia dipterocarpi</i>	224
Cryphalinæ, in key to subfamilies.....	224

	Page.
<i>Cryphalus</i> —	
host plants.....	208
posterior wings.....	180
types of genera.....	221
Crypturginæ, in key to subfamilies.....	225
<i>Crypturgus</i> —	
distribution.....	210
host.....	209
posterior wings.....	180
<i>Cyllene</i> , abdominal sternites.....	182
<i>Dendroctonus</i> —	
abdomen.....	35-39
abdominal pleurites.....	38-39
abdominal spiracles.....	182
abdominal tergites.....	180-181
anatomical.....	5-6
article.....	1-164
bibliography.....	159-164
bibliography and synonymy.....	80-81
brood galleries.....	203
comparison of head with <i>Pissodes strobi</i>	11
comparison of head with <i>Pterostichus</i>	11, 12, 21
distribution.....	210
eggs.....	64
epistoma.....	175
food habits.....	199
head.....	11-21
host.....	209
internal anatomy.....	51-52
larva.....	57-64, 197
larval mines.....	204
legs.....	39-40
mesopleura.....	29-30
mesosterna.....	30
mesotergum.....	28-29
mesothoracic and metathoracic wings.....	42-43
mesothoracic wings or elytra.....	49-51
mesothorax.....	28-30
metapleura.....	34-35
metasterna.....	35
metatergum.....	30-33
metathoracic or hind wings.....	43-49
metathorax.....	30-35
nomenclature.....	7-9
original description and translation.....	4
progressive modification of characters.....	67-68
prothorax.....	26-28
pupa.....	53-57
pupal cell.....	204
reproductive organs.....	188, 189, 190
revisional notes.....	5
spiracles.....	39
secondary sexual characters.....	52-53, 196
thorax.....	22-51
wings.....	40-51

	Page.
<i>Dendroctonus adjunctus</i> —	
historical.....	3
original description.....	157-158
<i>Dendroctonus approximatus</i> —	
adult, variations, distinctive characters, revisional notes.....	101-103
bibliography and synonymy.....	104
distribution.....	104
galleries.....	104
historical.....	3
host trees.....	104
identified specimens.....	104
in synopsis of characters.....	70
larva.....	103
pupa.....	103
<i>Dendroctonus arizonicus</i> —	
adult, variations, distinctive characters, revisional notes.....	96
bibliography.....	97
distribution.....	97-211
galleries.....	97
historical.....	4
host tree.....	97
identified specimens.....	97
in synopsis of characters.....	70
larva.....	96
paired species.....	211
pupa.....	96
<i>Dendroctonus barberi</i> —	
adult, variations, distinctive characters, revisional note.....	86
bibliography and synonymy.....	87
distribution.....	86-87, 211
galleries.....	86
host trees.....	87
identified specimens.....	87
in synopsis of characters.....	70
larva.....	86
paired species.....	211
<i>Dendroctonus bifurcus</i> , historical.....	3
<i>Dendroctonus borealis</i> —	
adult, variations, distinguishing characters, revisional notes.....	133-134
bibliography and synonymy.....	135
distribution.....	135
historical.....	4
host tree.....	135
identified specimens.....	135
in synopsis of characters.....	72
<i>Dendroctonus brevicomis</i> —	
adult, variations, distinctive characters, revisional notes.....	81-83
bibliography and synonymy.....	84-85
distribution.....	84, 211
galleries.....	84
historical.....	3
host.....	68, 84
identified specimens.....	84
in synopsis of characters.....	70

	Page.
<i>Dendroctonus brevicomis</i> —Continued.	
larva.....	84
paired species.....	211
pupa.....	83-84
<i>Dendroctonus californicus</i> , historical.....	4
<i>Dendroctonus convexifrons</i> —	
adult, variations, distinctive characters, revisional notes.....	87-88
bibliography.....	90
distribution.....	89-90
galleries.....	89
host trees.....	90
identified specimens.....	90
in synopsis of characters.....	67, 70
larva.....	88-89
pupa.....	88
<i>Dendroctonus dietzi</i> , historical.....	4
<i>Dendroctonus engelmanni</i> —	
adult, variations, distinctive characters, revisional notes.....	130-131
bibliography and synonymy.....	133
distribution.....	132
galleries.....	132
host trees.....	133
identified specimens.....	133
in synopsis of characters.....	71
larva.....	131-132
paired species.....	211
pupa.....	131
<i>Dendroctonus fletcheri</i> , historical.....	4
<i>Dendroctonus frontalis</i> —	
adult, variations, distinctive characters, revisional notes.....	91
bibliography and synonymy.....	95
distribution.....	94, 211
galleries.....	94
historical.....	3
host.....	95
identified specimens.....	95
in synopsis of characters.....	70
larva.....	94
length of imago.....	10
paired species.....	211
pupa.....	93-94
pupal cell.....	204
terminal burrows.....	203
<i>Dendroctonus jeffreyi</i> —	
adult, variations, distinctive characters, note.....	114-115
in synopsis of characters.....	71
larva.....	115-116
pupa.....	115
<i>Dendroctonus juniperi</i> , historical.....	3
<i>Dendroctonus keeni</i> , historical.....	4
<i>Dendroctonus mexicanus</i> —	
adult.....	97-98
distribution.....	98
identified specimens.....	98

	Page.
<i>Dendroctonus mexicanus</i> —Continued.	
in synopsis of characters.....	70
paired species.....	211
<i>Dendroctonus micans</i> —	
adult, variations, distinctive characters.....	143-144
bibliography and synonymy.....	146
distribution.....	145, 211
galleries.....	144-145
host trees.....	145
identified specimens.....	145
in synopsis of characters.....	72
larva.....	144
paired species.....	211
type.....	3, 144
<i>Dendroctonus minimus</i> , historical.....	3
<i>Dendroctonus minor</i> , historical.....	3
<i>Dendroctonus monticolæ</i> —	
adult, variations, distinctive characters, revisional notes.....	105-106
bibliography and synonymy.....	109
distribution.....	108, 211
galleries.....	107
historical.....	4
host trees.....	109
identified specimens.....	109
in synopsis of characters.....	71
larva.....	106-107
paired species.....	211
pupa.....	106
<i>Dendroctonus murrayanæ</i> —	
adult, variations, distinctive characters.....	140-141
bibliography.....	142
distribution.....	142
galleries.....	141
host trees.....	142
identified specimens.....	142
in synopsis of characters.....	72
larva.....	141
<i>Dendroctonus obesus</i> —	
adult, variations, distinctive characters, revisional notes.....	135-136
bibliography and synonymy.....	138
distribution.....	137
galleries.....	137
host tree.....	137
identified specimens.....	137
in synopsis of characters.....	72
larva.....	136-137
pupa.....	136
<i>Dendroctonus parallelocollis</i> —	
adult, variations, distinctive characters.....	99-100
bibliography.....	101
distribution.....	100
galleries.....	100
historical.....	3

	Page.
<i>Dendroctonus parallelocolis</i> —Continued	
host trees.....	101
identified specimens.....	101
in synopsis of characters.....	70
paired species.....	211
<i>Dendroctonus piceaperda</i> —	
adult, variations, distinctive characters, revisional notes.....	126-127
bibliography and synonymy.....	130
distribution.....	129
galleries.....	128-129
historical.....	4
host trees.....	129
identified specimens.....	129-130
larva.....	127-128
paired species.....	211
pupa.....	127
<i>Dendroctonus piniperda</i> —	
historical.....	3
synonym of <i>Myelophilus piniperda</i>	5
<i>Dendroctonus ponderosæ</i> —	
adult, variations, distinctive characters, revisional notes.....	109-111
bibliography and synonymy.....	114
distribution.....	112-113, 211
economic relation to forests.....	113
galleries.....	112
historical.....	4
host trees.....	113
identified specimens.....	113-114
in synopsis of characters.....	71
larva.....	111
paired species.....	211
pupa.....	111
pupal cell.....	204
<i>Dendroctonus pseudotsugæ</i> —	
adult, variations, distinctive characters, revisional notes.....	121-123
bibliography and synonymy.....	126
distribution.....	124-125
galleries.....	124
historical.....	124
hosts.....	68, 125
identified specimens.....	125
in synopsis of characters.....	71
pupa.....	123-124
<i>Dendroctonus punctatus</i> —	
adult, variations, distinctive characters, revisional notes.....	142-143
bibliography and synonymy.....	143
distribution.....	142-143, 211
historical.....	3
host tree.....	142
in synopsis of characters.....	72
paired species.....	211

	Page.
<i>Dendroctonus rufipennis</i> —	
adult, variations, distinctive characters, revisional notes.....	138-140
bibliography.....	140
distribution.....	140
host tree.....	140
identified specimens.....	140
in synopsis of characters.....	72
<i>Dendroctonus shoshone</i> , historical.....	4
<i>Dendroctonus similis</i> , historical.....	3
<i>Dendroctonus simplex</i> —	
adult, variations, distinctive characters, revisional notes.....	117-118
bibliography and synonymy.....	120-121
distribution.....	120
galleries.....	119-120
historical.....	3
host.....	68, 120
identified specimens.....	120
in synopsis of characters.....	71
larva.....	119
pupa.....	118-119
<i>Dendroctonus</i> spp., relation to host trees.....	78
<i>Dendroctonus terebrans</i> —	
adult, variations, distinctive characters, revisional notes.....	147-148
bibliography and synonymy.....	150
distribution.....	149-150
galleries.....	149
historical.....	3
host trees.....	150
identified specimens.....	150
in synopsis of characters.....	72
larva.....	149
paired species.....	211
pupa.....	149
<i>Dendroctonus valens</i> —	
adult, variations, distinctive characters, revisional notes.....	151-152
bibliography and synonymy.....	156-157
distribution.....	154-155
galleries.....	153-154
historical.....	3
hosts.....	68, 156
identified specimens.....	156
in synopsis of characters.....	72
larva.....	152-153
length of imago.....	10
paired species.....	211
pupa.....	152, 196
<i>Dendroctonus wickhami</i> , historical.....	4
(<i>Dermestes</i>) <i>piniperda</i> , included in <i>Dendroctonus</i>	3
<i>Dermestes scolytus</i> , described by Sulzer.....	220
<i>Dermestes typographus</i> , type of genus <i>Ips</i>	220
<i>Dipterocarpus grandiflora</i> , host of <i>Webbia dipteroearpi</i>	223
<i>Dolurgus</i> , host.....	209

	Page.
<i>Dryocates</i> —	
hosts.....	209
reproductive organs.....	192-195
<i>Dryocates autographus</i> , paired species.....	211
<i>Dryocates septentrionis</i> , paired species.....	211
<i>Eccoptogaster</i> , described by Herbst.....	220
<i>Eccoptopterus</i> , armature.....	176
<i>Erineophilus schwarzi</i> , reproductive organs.....	192
<i>Ernoporus</i> , reproductive organs.....	194
<i>Fagus</i> , host of <i>Scolytus</i>	209
<i>Fraxinus</i> , host of <i>Hylesinus</i> and <i>Pteleobius</i>	209
Genyocerinae, in key to subfamilies.....	225
<i>Gnathotrichus</i> , host.....	209
Hexacolinae, in key to subfamilies.....	225
<i>Hicoria</i> , host of <i>Scolytus</i>	209
HOPKINS, A. D.—	
paper, "Preliminary Classification of the Superfamily Scolytoidea".....	165-232
paper, "The Genus <i>Dendroctonus</i> ".....	1-164
<i>Hylastes</i> —	
head.....	177
host.....	209
types of genera.....	221
<i>Hylesinus</i> —	
abdominal spiracles.....	182
abdominal sternites.....	182
host.....	209
(<i>Hylesinus</i>) <i>minimus</i> —	
included in <i>Dendroctonus</i>	3
synonym of <i>Carphoborus minimus</i>	5
(<i>Hylesinus</i>) <i>minor</i> , included in <i>Dendroctonus</i>	3
<i>Hylesinus</i> —	
nuptial chamber.....	202
reproductive organs.....	188, 192, 195
<i>Hylocurus</i> , armature.....	176
<i>Hylurgops</i> —	
abdominal spiracles.....	182
head.....	177
<i>Hylurgops glabratus</i> , paired species.....	211
<i>Hylurgops pinifex</i> , paired species.....	211
<i>Hylurgus</i> , host plant.....	209
<i>Hylurgus minor</i> , synonym of <i>Myelophilus minor</i>	5
<i>Hylurgus obesus</i> , historical.....	3
<i>Hylurgus rufipennis</i> , historical.....	3
Hyorrhynchinae, in key to subfamilies.....	225
<i>Hypoborus</i> —	
distribution.....	210
legs.....	179
<i>Hypothenemus</i> —	
antennal club.....	173
antennal funicle.....	171
distribution.....	210
elytra.....	179
hosts.....	209

<i>Hypothenemus</i> —Continued.	Page.
legs.....	179
posterior wings.....	180
secondary sexual characters.....	195
size.....	175
social habits.....	200
types of genera.....	221-222
<i>Hypothenemus miles</i> , armature.....	176
Ipidae, in key to families.....	224
Ipinae, in key to subfamilies.....	224
<i>Ips</i> —	
armature.....	176
brood galleries.....	203
galleries.....	201
hosts.....	209
nuptial chamber.....	202
reproductive organs.....	188, 192, 195
social habits.....	200
<i>Juniperus</i> , host of <i>Monarthrum</i> and <i>Corthylus</i>	209
<i>Larix</i> —	145
host of <i>Dendroctonus micans</i>	145
host of <i>Dendroctonus pseudotsugæ</i>	68
host of <i>Dendroctonus simplex</i>	68
host of <i>Dendroctonus valens</i>	68
<i>Larix laricina</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus simplex</i>	120, 156
<i>Larix occidentalis</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus pseudotsugæ</i>	125
<i>Lepidomus</i> , types of genera.....	222
<i>Liparthrum</i> , distribution.....	210
<i>Lymantria</i> , reproductive organs.....	192, 195
Micracinae, in key to subfamilies.....	224
<i>Micracis</i> —	
legs.....	179
pupal cell.....	204
reproductive organs.....	188
<i>Monarthrum</i> —	
armature.....	176
host.....	209
<i>Myelophilus</i> , <i>Dendroctonus piniperda</i> and <i>D. minor</i> referred to it.....	3
Phloeoborinae, in key to subfamilies.....	225
<i>Phloeoborus</i> —	
legs.....	179
size.....	175
<i>Phloeophthorus</i> , nuptial chamber.....	202
<i>Phloeosinus</i> —	
food plants.....	199
nuptial chamber.....	202-203
Phloeotribinae, in key to subfamilies.....	225
<i>Picea</i> , host of <i>Dendroctonus micans</i>	145

	Page.
<i>Picea canadensis</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus borealis</i>	135
host of <i>Dendroctonus engelmanni</i>	133
host of <i>Dendroctonus piceaperda</i>	129
host of <i>Dendroctonus valens</i>	156
<i>Picea engelmanni</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus engelmanni</i>	133
host of <i>Dendroctonus monticolæ</i>	109
host of <i>Dendroctonus murrayanæ</i>	142
host of <i>Dendroctonus ponderosæ</i>	113
<i>Picea excelsa</i> —	
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus valens</i>	156
<i>Picea mariana</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus piceaperda</i>	129
<i>Picea rubens</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus piceaperda</i>	129
host of <i>Dendroctonus punctatus</i>	142
host of <i>Dendroctonus terebrans</i>	150
host of <i>Dendroctonus valens</i>	156
<i>Picea sitchensis</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus obesus</i>	137
<i>Pinus</i> —	
host of <i>Crypturginæ</i>	209
host of <i>Dendroctonus micans</i>	145
host of <i>Dendroctonus valens</i>	68
host of <i>Gnathotrichus</i>	209
host of <i>Hylesininæ</i>	209
host of <i>Monarthrum</i> and <i>Corthylus</i>	209
host of <i>Pityogenes</i> and <i>Ips</i>	209
<i>Pinus arizonica</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus approximatus</i>	104
host of <i>Dendroctonus valens</i>	156
<i>Pinus ayacahuite</i> —	
host of <i>Dendroctonus mexicanus</i>	98
host of <i>Dendroctonus parallelocollis</i>	101
<i>Pinus chihuahuana</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus approximatus</i>	104
host of <i>Dendroctonus convexifrons</i>	90
host of <i>Dendroctonus valens</i>	156
<i>Pinus echinata</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus terebrans</i>	150

	Page.
<i>Pinus edulis</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus barberi</i>	87
host of <i>Dendroctonus valens</i>	156
<i>Pinus flexilis</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus ponderosæ</i>	113
<i>Pinus glabra</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
<i>Pinus jeffreyi</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus jeffreyi</i>	116
host of <i>Dendroctonus valens</i>	156
<i>Pinus lambertiana</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus brevicomis</i>	84
host of <i>Dendroctonus jeffreyi</i>	116
host of <i>Dendroctonus monticolæ</i>	109
host of <i>Dendroctonus valens</i>	156
<i>Pinus lejophylla</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus mexicanus</i>	98
host of <i>Dendroctonus parallelocollis</i>	101
<i>Pinus monticola</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus monticolæ</i>	109
<i>Pinus murrayana</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus monticolæ</i>	109
host of <i>Dendroctonus murrayana</i>	142
host of <i>Dendroctonus ponderosæ</i>	113
host of <i>Dendroctonus valens</i>	156
<i>Pinus palustris</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus terebrans</i>	150
<i>Pinus ponderosa</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus brevicomis</i>	84
host of <i>Dendroctonus jeffreyi</i>	116
host of <i>Dendroctonus monticolæ</i>	109
host of <i>Dendroctonus valens</i>	156
<i>Pinus ponderosa scopulorum</i> —	
host of <i>Dendroctonus approximatus</i>	104
host of <i>Dendroctonus arizonicus</i>	97
host of <i>Dendroctonus barberi</i>	87
host of <i>Dendroctonus convexifrons</i>	90
host of <i>Dendroctonus ponderosæ</i>	113
<i>Pinus pungens</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95

	Page.
<i>Pinus radiata</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus valens</i>	156
<i>Pinus rigida</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus terebrans</i>	150
host of <i>Dendroctonus valens</i>	156
<i>Pinus scopulorum</i> , host of <i>Dendroctonus</i>	79
<i>Pinus serotina</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus terebrans</i>	150
<i>Pinus</i> sp., host of <i>Dendroctonus valens</i>	156
<i>Pinus strobiformis</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus ponderosæ</i>	113
host of <i>Dendroctonus valens</i>	156
<i>Pinus strobus</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus rufipennis</i>	140
host of <i>Dendroctonus terebrans</i>	150
host of <i>Dendroctonus valens</i>	156
<i>Pinus sylvestris</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus valens</i>	156
<i>Pinus tæda</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus terebrans</i>	150
<i>Pinus teocotl</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus mexicanus</i>	98
<i>Pinus teocotl</i> (?), host of <i>Dendroctonus parallelocollis</i>	101
<i>Pinus virginiana</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus frontalis</i>	95
host of <i>Dendroctonus valens</i>	156
<i>Pissodes</i> —	
abdominal sternites.....	182
reproductive organs.....	188
<i>Pissodes strobi</i> , comparison of head with <i>Dendroctonus</i>	11
<i>Pityogenes</i> —	
armature.....	176
connecting galleries.....	203
host plants.....	209
social habits.....	200
<i>Pityophthorus</i> —	
antennal club.....	173
connecting galleries.....	203
nuptial chamber.....	202
reproductive organs.....	190, 195
Platypodidæ, in key to families.....	224
Platypodinæ, in key to subfamilies.....	225

	Page.
<i>Platypus</i> —	
abdominal tergites.....	181
food habits.....	199
general habits.....	198
larvæ.....	197
legs.....	179
social gallery.....	202
<i>Polygraphus</i> , types of genera.....	222
<i>Populus</i> , host of <i>Trypophlæus</i>	209
<i>Pseudotsuga</i> , host of <i>Dendroctonus pseudotsugæ</i>	68
<i>Pseudotsuga macrocarpa</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus pseudotsugæ</i>	125
<i>Pseudotsuga taxifolia</i> —	
host of <i>Dendroctonus</i>	79
host of <i>Dendroctonus barberi</i>	87
host of <i>Dendroctonus pseudotsugæ</i>	125
host of <i>Scolytus</i>	209
<i>Pteleobius</i> —	
food habits.....	199
host.....	209
<i>Pterostichus</i> , comparison of head with <i>Dendroctonus</i>	11, 12, 21
<i>Pycnarthrum</i> —	
epistoma.....	175
labrum.....	175
<i>Quercus</i> —	
host of <i>Dryocætes</i>	209
host of <i>Scolytus</i>	209
<i>Salix</i> , host of <i>Trypophlæus</i>	209
Scolytidæ, in key to families.....	224.
Scolytinæ, in key to subfamilies.....	225
Scolytoidea—	
antennæ.....	171-174
article.....	165-232
bibliography.....	229-232
body.....	175-183
eggs.....	197
embryo.....	197
eyes.....	174
general anatomy.....	168
general characters.....	175-195
genera of doubtful position.....	228
genera provisionally assigned to subfamilies.....	227
internal anatomy.....	183-195
larva.....	197
morphological characters.....	169-198
mouthparts.....	174-175
physiological characteristics.....	198-210
position.....	167-168
position of principal described genera.....	226-227
pupa.....	196
secondary sexual characters.....	195-196
taxonomy.....	216

	Page.
Scolytoplatypodidæ, in key to families.....	224
Scolytoplatypodinæ, in key to subfamilies.....	225
<i>Scolytoplatypus</i> —	
food habits.....	199
general habits.....	198
<i>Scolytus</i> —	
abdominal sternites.....	182
distribution.....	210
food habits.....	199
galleries.....	201
host plants.....	209
legs.....	179
nuptial chamber.....	202
reproductive organs.....	194, 195
types of genera.....	219–220
<i>Scolytus muticus</i> —	
pupal cell.....	204
reproductive organs.....	192
<i>Scolytus punctatus</i> , described by Müller.....	220
<i>Scolytus quadrispinosus</i> —	
food burrows.....	203
reproductive organs.....	188, 192
<i>Scolytus rugulosus</i> —	
food burrows.....	203
reproductive organs.....	188, 192
(<i>Scolytus terebrans</i> , included in <i>Dendroctonus</i>)	3
<i>Scolytus terebrans</i> , synonym of <i>Dendroctonus terebrans</i>	5
<i>Stenoscelis</i> , general habits.....	198
<i>Stephanoderes</i> —	
antennal funicle.....	171
distribution.....	210
food habits.....	199
head.....	177
pupal habits.....	199
secondary sexual characters.....	195
social habits.....	200
<i>Taphrorychus</i> , reproductive organs.....	195
<i>Thysanoes</i> , pupal cell.....	204
<i>Tomicus</i> —	
food plants.....	199
types of genera.....	220–221
<i>Tomicus</i> (<i>Myelophilus</i>), host.....	209
<i>Trypophlæus</i> , hosts.....	203–209
<i>Ulmus</i> , host of <i>Scolytus</i>	209
<i>Webbia</i> —	
legs.....	179
original description.....	222, 223
<i>Webbia dipteroearpi</i> , description.....	223
<i>Webbinæ</i> , in key to subfamilies.....	224

	Page.
<i>Xyleborus</i> —	
antennal funicle.....	171
armature.....	176, 177
distribution.....	210
food habits.....	199
general habits.....	198
hosts.....	209
reproductive organs.....	188, 192, 195
secondary sexual characters.....	195
social gallery.....	202
social habits.....	200
varieties.....	217
<i>Xyleborus fuscatus</i> , possibly embraces <i>X. viduus</i>	217
<i>Xyleborus inermis</i> , possibly embraces <i>X. planicollis</i>	217
<i>Xyleborus planicollis</i> , possibly an odd type of <i>X. inermis</i>	217
<i>Xyleborus saxeseni</i> , social chamber.....	202
<i>Xyleborus viduus</i> , possibly an odd type of <i>Xyleborus fuscatus</i>	217
<i>Xylocleptes</i> —	
armature.....	176
reproductive organs.....	188, 195
Xyloctoninæ, in key to subfamilies.....	224
<i>Xyloterus bivittatus</i> , paired species.....	211
<i>Xyloterus lineatus</i> , paired species.....	211



