A MANUAL OF DANGEROUS INSECTS LIKELY TO BE INTRODUCED IN THE UNITED STATES THROUGH IMPORTATIONS.

EDITED BY

W. DWIGHT PIERCE,
Entomologist, Southern Field Crop Insect Investigations.

WASHINGTON: GOVERNMENT PRINTING OFFICE. 1918.
Different Stages of the Gipsy Moth (Porthetria dispar).

Egg mass on center of twig; female moth ovipositing just below; female moth below, at left, enlarged; male moth, somewhat reduced, immediately above; female moth immediately above, somewhat reduced; male moth with wings folded in upper left; male chrysalis at right of this; female chrysalis again at right; larva at center. (Howard and Fisk.)
A MANUAL OF DANGEROUS INSECTS LIKELY TO BE INTRODUCED IN THE UNITED STATES THROUGH IMPORTATIONS.

EDITED BY
W. DWIGHT PIERCE,
Entomologist, Southern Field Crop Insect Investigations.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1918.
A MANUAL OF DANGEROUS INSECTS LIKELY TO BE INTRODUCED IN THE UNITED STATES THROUGH IMPORTATIONS.

This publication has been prepared in the Bureau of Entomology at the request of and in cooperation with the Federal Horticultural Board to supply such information as is required by its officers and others in the enforcement of quarantines and the safeguarding of this country against foreign insect pests. It should assist materially in preventing the introduction of additional pests like the gipsy moth, boll weevil, and alfalfa weevil. Only a brief sketch can be given of each of the more important species. The plants making up the commerce in vegetable products are arranged alphabetically by the American common name, with the scientific name following. It is believed that this arrangement is most convenient for inspectors. A brief sketch of certain important facts concerning each plant is also given.

The arrangement under each plant of the insects in two or more categories, A, B, etc., is merely one of convenience. Under A are grouped the better known insects, or those concerning which there is available literature. This category especially contains pests which are easily imported. Under B are listed many important pests, possibly sometimes more important than those listed in A and often just as readily introduced. They are merely listed because full descriptive matter was not available and for other similar reasons. In later editions probably many of these pests will merit fuller discussion.

It is not to be expected that inspectors will attempt to make final determinations with the aid of this work. In fact, it would be very unwise to do so. The book is merely to indicate to inspectors and entomologists the insects likely to be found associated with importations.

The references to foreign literature under the species give the best or most easily available source of additional information. Tables and keys to species could not possibly be included in a work of this kind. It is expected that the inspector, on finding important insects not already familiar to him, will immediately transmit specimens to the Bureau of Entomology at Washington, D. C., for reference to the proper authorities or to other competent specialists in the groups to which the insects belong.
This compilation was only possible by the cooperation of all the divisions of the Bureau of Entomology, some of which prepared the matter in the form in which it now appears. The editor therefore wishes to acknowledge the assistance of Messrs. C. L. Marlatt, W. D. Hunter, A. D. Hopkins, the late F. M. Webster, F. H. Chittenden, A. L. Quaintance, W. R. Walton, E. R. Sasseer, Jacob Kotinsky, Dwight Isely, H. L. Sanford, and R. W. Rust for the collection of the notes on the insect enemies of the crops investigated by them, and of Messrs. W. R. Walton, Harry B. Bradford, and the late J. F. Strauss in the preparation of the illustrations.

The lists of insects included in this manual are necessarily incomplete, and no doubt important species have been omitted. Frequently the literature on dangerous species is so meager as to make it impossible to conclude as to the importance of the species.

Regarding the nomenclature, it should be remembered that this work is strictly a compilation. Many of the names will undoubtedly be changed as the result of future studies. The ones used, however, are the ones current in European literature. To have attempted to make the nomenclature more exact would have involved practically the revision of many large groups of insects. This would have been entirely impracticable and would have delayed publication of the manual for years. Moreover it would have resulted in a publication which inspectors would have had difficulty in using on account of the fact that the literature accessible to them would have, in many cases, used other names. In order to make future editions of this handbook more useful, the bureau will be greatly obliged for criticism, additions, and recommendations as to treatment.

The majority of the insect pests in the United States which now occasion the greatest damage to orchard, field, and garden crops and to stored products and in homes, etc., are of foreign origin, and were introduced with the host plants or accidentally in the course of commerce. Such introductions of new pests are going on all the time, as illustrated by such recent arrivals as the Argentine ant in New Orleans and the alfalfa leaf weevil in Utah. The list of over 100 introduced insect pests given below illustrates the nature of the most important of these introductions in the past. This handbook contains the names of hundreds of other insects which now occur in different parts of the world and which are liable to be introduced at any time with nursery stock or in merchandise or as accidental guests or stowaways on ships or in baggage. It also includes a considerable number of introduced pests which are not now generally distributed and which therefore should be guarded against both as to further entry and to further distribution within the United States.

Throughout the work species which have been introduced into the United States are marked with an asterisk (*) and the fact of the
introduction is mentioned. Many of the most important introduced insects are omitted because they are now so generally distributed that the importation of a few additional individuals will have no effect upon the existing economic conditions.

LIST OF IMPORTANT FOREIGN INSECTS WHICH HAVE BEEN INTRODUCED INTO THE UNITED STATES.

MITES (ACARINA).

Orange rust mite or lemon mite, *Eriophyes olivaceus* Ashmead. (See Citrus.)
Grape blister mite, *Eriophyes vitis* Landois. (See Grape.)
Pear leaf blister mite, *Eriophyes piri* Pagenstecher. (See Pear.)
Plum blister mites, *Eriophyes phlopocephales* Nalepa and *E. padi* Nalepa. (See Plum.)
Potato root mite, *Rhizoglyphus (Coccyphagus) echinopus* Fumonze and Robin. (See Potato.)

THrips (THYSANOPTERA).

Onion thrips, *Thrips tabaci* Lindl.
Pear thrips, *T. pyri* Daniel.
Red-banded thrips, *Heliothrips rubrocinclus* Gard. (See Fruits.)

Scales, Hugs, Aphids (HEMIPTERA).

Saw-toothed grain beetle, *Sitona lineatus* Herrich-Schaeffer. (See Cotton.)
Lesser grain-borer, Rhizopertha dominica. Fabricius.

Dray-store beetle, Sitotroga pronica. Linnaeus.

Clarette beetle, Lasioderma serricorne. Fabricius.

Red-rot flour beetle, Tribolium ferrugineum. Fabricius.

Poplar borer, Saperda carcharias. Linnaeus. (See Poplar.)

Willow leaf-beetle, Phyllotreta vitellinae. Linnaeus. (See Willow.)

Elm leaf-beetle, Galerucella tuteola Müller.

Crucifer leaf-beetles, Phyllotreta virescens and P. armatorum Koch. (See Crucifer.)

California grape rootworm, Adoxus obscurus. Linnaeus. (See Grape.)

Beet tortoise beetle, Cassida nebulosa. Linnaeus. (See Beet.)

Asparagus beetle, Crioceres asparagi. Linnaeus. (See Asparagus.)

Asparagus borer, Crioceres puncata. Linnaeus. (See Asparagus.)

Bean weevils, Mylabris fruinaeus Boheman, M. pisorum Linnaeus, M. lecanis Frölich, A canthoscelides obtectus Say, Pachymerus chinensis Linnaeus, P. quadrimaculatus Fabricius. (See Beans.)

The poplar and willow curbelle, Cryptophygenes lapathi. Linnaeus. (See Alder, Birch, Poplar.)

Austrian alfalfa leaf weevil, Hypera melos. Fabricius. (See Alfalfa.)

The clover leaf weevil, Hypera postica. Fabricius. (See Alfalfa.)

The alfalfa weevil, Hypera postica. Gyllenhal. (See Alfalfa.)

Clover leaf weevils, Hypera melos Fabricius and Hypera nigrivestris Fabricius. (See Clover.)

Broad-nosed grain weevil, Conophthorus latiusculus. Say. (See Avoado.)

Root weevils, Polydrusus seriecus Schaller and P. viridicolle Baudi. (See Beech.)

Coffee-bean weevil, Arceles fascieolatus. De Geer. (See Corn.)

Sweet-potato weevils, Cylis formicarius. Fabricius.

Clover root weevils, Sitona flavescens Marsh and Sitona hispidula. Fabricius. (See Clover.)

Strawberry root weevil, Brachysinus ovatus Linnaeus (Oriphygenus). (See Conifers.)

Grain weevils, Calandra granaria Linnaeus and C. oryzae. Linnaeus. (See Corn.)

Grape root weevils, Brachysinus sultenius. Fabricius. (See Grape.)

Fruit-tree lark beetle, Seolytus rufus. Ratzeburg.

**MOTHS (LEPIDOPTERA):**

The gypsy moth, *Porthetria dispar.* Linnaeus. (See Forests.)

The cotton bollworm, *Chloridea obletta.* Fabricius.

The beet army worm, *Laphygma exigua.* Hübner (Caradrina).

The apple moth, *Argyrostoma conjugella.* Zeller. (See Apple.)

Horse-chestnut borer, *Zenzeria pyrina.* Linnaeus. (See Horse-chestnut.)

Beech tortruck, *Peraeus ferruginea.* Treitschke. (See ieech, Birch.)

Hawaiian beet webworm, *Hywenia fasciata.* Cramer. (See Beet.)

Beet worm, *Plasia garna.* Linnaeus. (See Beet.)

Diamond-back moth, *Plutella maculipennis.* Curtis. (Attacks turnip, cabbage, canflower.)


European pine shoot moth, *Ectria buoliana.* Schiffermiller. (See Conifers, C.)

Pine bud and gall moths, *Ectria turionsana.* Hübner; *E. pinivora.* Zeller; *E. duvaliana.* Hübner. (See Conifers, C.)

Brown-tail moth, *Euproctis chrysorrhoea.* Linnaeus. (See Forests.)

Pea moth, *Laspeyresia nigricans.* Stephens. (See Pea.)

Sugar-cane borer, *Diaatra cincoecalis.* Fabricius. (See Sugar cane.)


Imported cabbage butterfly, *Ponilia rapae.* Linnaeus.

Angoumois grain moth, *Sitotroga cerealella.* Olivier.

Coding moth, *Laspeyresia pomonella.* Linnaeus.

European grain moth, *Tinea granella.* Linnaeus.

Indian meal moth, *Plodia interpunctella.* Hübner.

Fic moth, *Ephestia cautella.* Walker.

Cutworms, *Peridroma, Agrotis, Felina,* etc.

**SAWFIES (HYMENOPTERA):**

Coniferous sawfly, *Diprion similis.* Hartig. (See Conifers, B.)

Currant worm, *Pyronidia ribesii.* Scopoli.

Rose sawfly, *Chalidius pectinicornis.* Forc.


Rose sawfly, *Ctirophora aestiopsis.* Fabricius.


Elm sawfly, *Fonusa dohrnii.* Tischbein.

1 The generic name Mylabris Geoffroy 1702 has precedence over Luria Scopoli and Bruchus Linnaeus as used for the bean weevils and is the name which should be followed in future literature.—W. D. Pierce.
INSECTS Specially LIABLE TO IMPORTATION.

FLIES (DIPTERA).

Imported cabbage maggot. Chortophila (Pegomya) brassicae Bouché.
Seed-corn maggot. Chortophila (Pegomya) fuscaespis Zetterstedt.
Grain gall midge. Contarinia triacli Kirby. (See Grains.)
Hessian fly. Phytophaga destructor Say (Maggiola). (See Grains.)
Pear gall midge. Contarinia pyriovora Riley. (See Pear.)
Imported onion maggot. Chortophila (Pegomya) cep]._orum Medde.
Spinach leaf miner. Chortophila (Pegomya) hyoscyami Linnaeus (vicina Lintner).

INSECTS Specially LIABLE TO IMPORTATION AT ANY TIME.

There are certain groups of insects which are uniformly injurious and can not therefore be given full justice in a bulletin of this type. These insects should be especially guarded against and excluded on general principles, whether incriminating evidence is found or not.

TERMITES (TERMITIDÆ).

There have been several cases of introduction of termites into the United States, notable among which was the importation of Leucotermes lucifugus Rossi in packing boxes from Germany. The termites are uniformly injurious to wood and plant growth and may be imported in any type of wood, whether in the form of nursery stock, lumber, or manufactured product. A list of species is to be found in Wytsman's Genera Insectorum by Desneux (1903).

THRIPS (THYSANOPTERA).

The tiny fringe-winged thrips are very destructive to many crops, and should always be guarded against.

SCALE INSECTS (COCCIDÆ).

These tiny insects are inconspicuous and the greatest of care is necessary on the part of inspectors to prevent their introduction. This family may be considered, as a whole, a most undesirable group of insects. Many species have already been introduced and become serious pests. Reference to Mrs. Fernald's Catalogue of Coccidæ as well as Technical Bulletins 12 and 16 of the Bureau of Entomology will give full data as to literature. L. Lindinger, in his "Die Schilddüse (Coccidæ)," gives tables to the species of European scale insects attacking each plant. All names of scale insects used in this bulletin have been verified by Mr. E. R. Sasscer. Several genera of scales are illustrated on plates r-v to assist in determination. Some of the species illustrated are not treated in the text, although congeneric species are.

WHITE FLIES (ALEYRODIDÆ).

The tiny white flies are very apt to slip in past even a zealous inspector. The flattened scalelike larve of some species look so much like the plant tissue that they are easily overlooked. The active little white-winged adults fly so quickly that rough handling would tend merely to disperse them and increase the dangers of introduction. Kirkaldy in 1907 issued a world checklist in Bulletin 2, Hawaii Board of Commissioners Agriculture and Forestry. (See Technical Bull. 27, of the Bureau of Entomology and Proc. U. S. Nat. Mus., No. 2156.)

RED SPIDERS; MITES (ACARINA).

These tiny eight-legged creatures are not insects, but so closely related that they are generally treated as such. The red spiders are exceedingly minute and occur on almost every type of vegetation. As their rate of multiplication is very rapid
they have become serious pests to agriculture. There are a number of four-legged blister mites of great importance and yet so small that they can only be seen with a very high power lens.

**BARKBEETLES (SUPERFAMILY SCOLYTOIDEA: FAMILIES IPID.É, SCOLYTOPLATYPODID.É, SCOLYTID.É, AND PLATYPODID.É).**

All of the bark beetles, ambrosia beetles and other members of this family are more or less injurious to tree growth, forest products, tree seeds, fruits, etc., and species known to be injurious must be carefully guarded against. These beetles are small, cylindrical with elbowed and clubbed antennae. The head is without or with very short beak and the submentum is without a gular peduncle. In Ipid.é and Scolytidae (Hopkins’s classification) the first joint of the tarsus is shorter than the others combined, while in PlatyPodid.é the first joint is as long or longer than the others. They all bore in the plant tissue to deposit their eggs and their burrows or galleries are characteristic of groups, genera, and species. The food consists of plant tissue except in the ambrosia beetles where it consists of so-called ambrosia fungi. Genera Insectorum has issued a fascicle on Ipid.é=Superfamily Scolytoidae of Hopkins, with catalogue of species of the world.

**BEAN WEEVILS (MYLABRID.É—BRUCHID.É, LARIID.É).**

The seed weevils or bruchids breed almost entirely in the seeds of plants, especially of the bean and pea family. They are uniformly injurious and should be excluded. These beetles are usually small and either oval or elongate, with the head carried in a downward position and with the antennae often pectinate or plumose. The elytra do not completely cover the abdomen. A catalogue of the Mylabridae (Bruchidae) has been issued by Junk.

**CUTWORMS; ARMY WORMS (NOCTUID.É).**

Several species of cutworms and army worms have already become world wide in their distribution through their strong flying ability and by commerce. As the larvae are very generally destructive and not all exclusive in food habits, they need to be carefully guarded against. Larvae may be transported anywhere on the ships. *Cirphis unipuncta* Haworth, the army worm; *Spodoptera mauritia* Boisdval, the grass army worm, and *Agrotis ypsilon* Rottenburg, the greasy cutworm, are practically cosmopolitan. A discussion of most of the injurious species will be found in Sorauer’s Handbuch der Pflanzenkrankheiten, 3d ed., 1913, vol. 3, pp. 348-374.

**WEEVILS. RHYNCHOPHORA—COLEOPTERA.**

The experience of the last few years in the quarantine of horticultural products has shown that one of the groups most likely to introduction is the group of weevils which comprise a large section of the order Coleoptera.

Owing to the development of many species of weevils in the roots, stems, and fruit of almost every type of plant known, it is very easy to introduce them in immature stages in such a manner that they may take hold and attack the introduced plant. Owing to the necessity of determining practically all of the weevils introduced by a search through foreign literature a majority of the species so far introduced

DANGEROUS SCALE INSECTS.

The mango scale (*Leucaeus indica), upper figures. The hackberry scale (*Lecaniodiaspis celtidis), lower figures. (Original, Sasseer.)
DANGEROUS SCALE INSECTS.

Fig. 1.—The bamboo scale (Chionaspis graminis). Fig. 2.—The fluted scale (*Icerya purchasi). Fig. 3.—The citrus scale (*Pseudococcus citri). Fig. 4.—*Coccus hesperidum, a scale of citrus tea, and palms. (Original, Sasscer.)
AUSTRALIAN SCALE INSECTS.

Fig. 1.—The cordyline scale (Leucaspis cordylinidis). Figs. 2, 3.—A scale (Lepidosaphes pallens), of Xanthorrhoea. Fig. 4.—A scale (Chionaspis nitida) of Daviesia corymbosa. (Original Sasscer.)
DANGEROUS SCALE INSECTS.

Fig. 1.—The Atriplex scale \((Pulvinaria maskelli)\). Fig. 2.—A scale \((Orthocia insignis)\) of citrus, tea, etc. Fig. 3.—The plum and peach scale \((Lecanium prunastri)\). (Original, Sasscer.)
Fig. 1.—The cosmopolitan tea and olive scale (*Fiorinia theae*). Fig. 2.—The Mexican agave scale (*Chrysomphalus agavae*). Fig. 3.—The date palm scale (*Parlatoria blanchardi*). (Original, Sasscer.)
have not been determined or described. For this reason many important species are not included in the present edition.

The larvae of weevils are white or yellowish with a dark head shield and are usually found in a more or less curved position. Most of them are rather robust and with a very few exceptions have no legs or rudiments thereof.

The pupa can always be distinguished by the presence of the beak lying flattened between the legs.

The adult weevils are distinguished by the prolongation of the head into a beak. This may be very short and broad or very long and slender. They are furthermore characterized by having the tarsi four-jointed. Inspectors are urged to take every possible precaution against the introduction of any species of weevils and where immature or adult stages are found they should immediately place them in alcohol and send them to Washington for determination.

DANGEROUS FOREIGN INSECTS LIKELY TO BE INTRODUCED IN THE UNITED STATES THROUGH IMPORTATIONS, ARRANGED BY HOST PLANTS.

ACACIA; WATTLEs.

(Acacia spp. Family Leguminosae.)

This genus contains several hundred species distributed throughout the world in semitropical and temperate climates. The gum arabic of commerce is derived from Acacia senegal; a drug of commerce is obtained from the wood of A. catechu; a soap or hair wash from A. concinna; others furnish dyes, fiber, scented wood, or valuable timber. A number of species of this genus or very nearly related to it grow in our Southern States.

IMPORTANT ACACIA PESTS.

HEMIPTERA.

Coecidae.

Armed—

Aspidotus (Turgionia) acacix Morgan; New South Wales, Tasmania; Acacia pycnantha.
Aspidotus tasmaniæ Green; Australia.
Aspidotus (Pseudononidius) quadrirareolata Malenotti; Africa; A. asak.
Fiorinia acacix Maskell; Australia, New Zealand; A. pycnantha, A. pulchella, A. longifolia.
Lepidosaphes aecex Maskell; Australia; A. linifolia.
Lepidosaphes spinifera Maskell; Australia; A. pendula.
Lepidosaphes sonowalensis Malenotti; East Africa; A. asak.
Protodiaspis anomala Green; Australia.
Pseudobargonias glandulosas Newstead; Egypt; A. arabica.

Unarmed—

Akermes aeciculatus Maskell; Australia.
Akermes tecíæ Maskell; Australia; A. longifolia.
Astromecium ventricosum Maskell; Australia.
Ceroplastes crithraeus Leonard; Africa.
Ceroplastes micrurus Signoret; Egypt; A. arabica.
Cryptes boccausus Maskell; Australia; A. armata, A. calaminolia, A. linearis, A. longifolia, A. melanotria.
Epiceococcus aecex Maskell; West Australia; A. pulchella.
Kerms aecicex Maskell; Australia.
Leoniodespis aecicex Maskell; West Australia; attacks A. calaminolia, A. cyanophylla, A. microbota; and A. longifolia.
Leoniodespis africana Newstead; Egypt; A. arabica.
Leoniodespis dilatata Froggatt; Australia; A. discolor.
Pseudococcus aecicex Maskell; Australia; A. linearis, Albizia tophanta.
COLIPTERA.

Buprestides.

Molobasis splendidula Donovan; Australia; breeds in dead branches of Acacia longifolia.

Scarabaeidae.

Dipheucephala aurulenta Kirby; Australia; attacks foliage of black wattle.

Heterorhina hookeri White; India; attacks foliage of Acacia catechu.

Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; larvae attack roots of seedlings.

Polyphilla fullo Linnaeus; Europe; larvae attack roots of seedlings and adults attack foliage.

Cerambycidae.

Colesotoma spinator Fabricius; India; bores in shoots of A. arabica.

Lygeis mendica Pascoe; Australia; bores in twigs of black wattle.

Psychitesius sericus Newman; Australia; breeds in trunks and branches of A. longifolia, A. decurrens.

Piesarturus marginellus Hope; Australia; breeds in wood of A. longifolia.

Sternotoma bohemani Chevrolat; German East Africa.

Symphytodes neglectus; Australia; girdles branches of A. longifolia.

Symphytodes nigricornis; Australia; A. juniperina.

Symphytodes vestigialis; Australia.

Uracanthus triangularis Hope; Australia; attacks branches of black wattle.

Uracanthus stiposus, U. bicinettu and U. simillimus; Australia; attack A. longifolia.

Chrysomelidae.

Elephodesstriigrinus; Australia; defoliator.

Paropsis piger Oliver; Australia; attack foliage of black wattle.

Curculionidae (sens. lat.).

Chrysolophus speciabilis Fabricius; Australia; black wattle.

Leptose tribes Fabrisius; Australia; black wattle.

Rhinota horniptera Kirby; Australia; breeds in stems of Acacia suaveolens.

Mollicerus aceile; India.

LEPIDOPTERA.

Cossidae.

Zucera cuculi Boisduval, a goat moth; Australia; bores in the thicker branches and trunk of living trees of Acacia decurrens.

Geometridae.

Biston suppressaria Gn., a defoliator; India; attacks Acacia catechu, and A. modesta, as well as other trees.

Euchloris submissaria Walker, Lophodes sinistraria Guer, and Selidocera lycaenaria Gn. attacks the foliage of black wattle in Australia.

Selidocera escutaria and Thaumala clara Walker attack the foliage of wattles in Australia.

Hepialidae.

Pilebus hyalinus breeds at the roots of wattles in Australia.

Chrysaia lignivora Lewis; Australia. (See Apple.)

Lymantridae.

Teia anartoides Walker, the wattle moth; Australia; skeletonizes foliage. (See Fruit.)

Teia contraria Walker; Australia; defoliates.
Xyloryctidae. *Cryptophaga rubiginosa*; Australia; bores in twigs.

Tortricidae. *Argyroplecta illepida* Buhl.; Australia; India; Ceylon; Africa; attacks seed pods of *Acacia farnesiana*.

HYMENOPTERA.

Formicidae (sens. lat.). *Camponotus ligniperda* Latreille; an ant; Europe; attacks living wood.

LITERATURE.


Freitag. Australian Insects.

Lindinger, L. *Die Schilddrusen (Coccidae)*, 1912.


ALDER.

(*Alnus* spp. Family Betulaceae.)

Hardy ornamental trees and shrubs grown in Asia, Europe, North America, and South America. *Alnus rubra* is the most important timber tree. The genus is not attacked by many very serious pests, but any of the wood borers, especially, might become serious when transported to another country in nursery stock. Several pests have gained admission to the United States in some manner. These are indicated by an asterisk.

A. AN ALDER PEST LIKELY TO BE IMPORTED.

*Coleophora fuscellinella* Zell. (Alder Bud Moth. Elachistidae; Lepidoptera.)

*Host:* Alder.

*Injury:* Attacks buds and foliage.


*Distribution:* Germany.


B. OTHER IMPORTANT ALDER PESTS.

ACARINA.

Eriophyidae.

*Eriophyes larcis* Nalepa, a blister gall mite; England; on leaves of *Alnus glutinosa*.

ORTHOPTERA.

Acrididae.

*Podisma alpina* Koll., a green grasshopper of the mountain sections of Europe, Amur, and Japan; very destructive at times.

HEMIPTERA.

Psyllidae.

*Psylla alni* Linnaeus, a sucking bug; Germany; breeds on the leaves.

Coccidae.

*Phenacoccus acris* Signoret; Europe; attacks *Alnus glutinosa*, and *A. incana*.

*Pulexaria betulae alni* Douglas; England; attacks *Alnus glutinosa*.

*Lecanium capric* Linnaeus; England.

*Lecanium corni* Bouche; Europe; attacks *Alnus incana*.

*Lecanium corvii* Linnaeus; Europe; attacks *A. glutinosa* and *A. incana*.

*Chionaspis salicis* Linnaeus; Europe, Egypt; attacks *Alnus glutinosa, A. incana*, and *A. viridis*.

*Hemichionaspis* sp.; Japan.

*Aspidiotis (Targionia) alni* Marchal; France; attacks *Alnus glutinosa*.
Anobiidae.

*Neodamia rufescens* De Geer, a brown wood-boring beetle; Europe; injures the wood for technical purposes.

*Pilinus pratinicornis* Linnaeus, a shining dark-brown wood-boring beetle; Europe; injures the wood for technical purposes.

Buprestidae.

*Agrius viridis* Linnaeus, a greenish wood-boring beetle; Europe; bores in the wood of stems and branches. (See Oak.)

*lapidus* Fabricius (Porionata), a yellowish-red wood-boring beetle with greenish or bluish shimmer; Europe; bores in the last and sapwood of branches.

Scarabaeidae.

*Anomalus grandis* Hope, a large bright-green beetle; India; adult strips leaves, larvae at roots of *Alnus nepalensis*.

*Melolontha hippocastani* Fabricius, a large May beetle; Europe; gnaws roots.

*Melolontha melolontha* Linnaeus, a large May beetle; Europe; gnaws roots.

Cerambycidae.

*Obera linearis* Linnaeus, a long-horned wood-borer; Europe; attacks nursery stock especially.

Chrysomelidae.

*Agasta alni* Linnaeus, a blue leaf beetle; Europe; larvae and adults skeletonize foliage.

*Halicta viridis* Fabricius, a metallic blue or green leaf beetle; Europe; larvae and adults skeletonize foliage. (See Oak.)

*Melasma xena* Linnaeus, a leaf beetle; Europe; larvae and adults skeletonize leaves.

Attelabidae.

*Apoderus coryli* Linnaeus, a long-necked weevil; Europe; adults roll leaves into nests for young.

Rhyynchitidae.

*Byciscus betulae* Linnaeus, a metallic blue or green leaf-rolling weevil; Europe.

*Rhyncychus betulae* Linnaeus, a brown or black leaf-rolling weevil; Europe.

Curenilionidae.

*Cryptophyphus lapathi* Linnaeus, a weevil; Europe, and introduced into the United States; bores in young shoots, branches, bark, and wood. It attacks also poplars and willows in the Eastern United States and is an important pest.

*Hyllobius abietis* Linnaeus, an elongate weevil; Europe; bores in bark of seedlings.

*Orchites alni* Linnaeus, a jumping weevil; Europe; mines the leaves.

*Orchites tesellactus sumellaris* Zetterstedt, a jumping weevil; Europe; mines the leaves.

Scolytidae.

*Anisandrus dispar* Fabricius, a small wood-boring beetle; Germany; breeds in galleries in wood.

*Dryptocera alni* Gersch, a bark beetle; Germany; breeds in galleries in bark and sapwood.

*Tryphonius alni* Lindemann, a bark beetle; Europe; breeds in galleries in bark and sapwood of *Alnus incana*.

*Xyleutes domesticus* Linnaeus, an ambrosia beetle; Germany; breeds in galleries in wood and sapwood.

LEPIDOPTERA.

Tortricidae.

*Pteronata ferrugana* S. V., a greenish leaf-feeding larva; Europe, North America.

Cosciidae.

*Costus cosus* Linnaeus, a goat moth; Europe; bores in the wood. (See Willow.)

*Zeuzera pyri* Linnaeus, a white moth; Europe, Africa, North America; bores in the wood. This is an important pest. (See Horse chestnut.)

Sesiidae.

*Sesiia calliciformis* Linnaeus, a clear-winged moth; Europe; bores in bark and stumps of branches.

*Sesiia sphaciiformis* Gerning, a clear-winged moth; Europe; bores in wood.

Geometridae.

*Anisoptera xerocaria* Schiffermiller, a greenish measuring-worm; Europe; feeds on foliage.

*Lacuna dilutata* Borckh., a measuring-worm; Central Europe; feeds on foliage.

Lymantridae.

*Dendrolimus padi* Linnaeus, the red-tail moth. (See Forest defoliators.)

*Lymantria dispar* Linnaeus, the gipsy moth. An important pest in New England. (See Forest defoliators.)

Notodontidae.

*Phalera bucephala* Linnaeus, the moon-speckled moth. (See Forest defoliators.)
INSECTS OF ALDER AND ALFALFA.

CLIMBICIDAE.

Clímbex variabilis Klug., a sawfly; Europe; breeds on the foliage.

Trichiosoma lucorum Linnaeus, a sawfly; Europe; breeds on the foliage.

TENTREDILLIDAE.

Nematus (Crassus) septenriovialis Linnaeus, a sawfly; Europe; breeds on the foliage.

Papilotoma vagans Fallén, a sawfly; Europe; breeds on foliage.

XIPHYDRIIDAE.

Xiphydra canelus Linnaeus, a wood wasp; Europe; breeds in the wood.

LITERATURE.


Nüsslin, Otto.: Leitfaden der Foraminalekunde, 2d ed., 1913.

Bargagli, P.: Rassegna Biologica Rincofori Europei, 1883-1887.

Lindinger, L.: Die Schildläuse (Coccidae), 1912.

ALFALFA; LUCERNE.

(Medicago sativa Linnaeus. Family Leguminosae.)

Alfalfa is a staple forage plant in many parts of the world, being grown extensively in Europe, Asia, and South America, as well as in this country. Except in shipments of hay, the only danger of introducing pests is with the seed. Some very important European pests of alfalfa have in some manner already reached this country and are doing serious damage.

Most insects attacking clover are potential alfalfa pests and it is therefore advisable to consult the list of clover pests when dealing with alfalfa.

A. BETTER KNOWN ALFALFA PESTS LIKELY TO BE IMPORTED.

Colaspidea atrum Olivier.

(Black Alfalfa Leaf Beetle. Chrysmelidæ; Coleoptera.)

Host: Alfalfa.

Injury: Alfalfa.

Description and biology: A small shining black beetle with brownish tint on sides. Larva about 6 mm. long, blackish. Oviposits on leaves and tender shoots. The larvae feed on the foliage and move from field to field in armies. Pupates in the soil.

Distribution: Spain, Southern France.


Hypera murina Fabricius (Phytonomus).

(Alfalfa Leaf Weevil. Curculionidæ; Coleoptera.)

Hosts: Alfalfa (Medicago sativa L. and M. s. falcata L.)

Injury: Defoliates, very injurious.

Description: Weevil dull brown, oval, about 1 mm., covered with fine gray and brown hairs. Oviposits in stems long rows of eggs. Larvae feed on the foliage. Pupates in silken cocoon on plant.

Distribution: Europe.

A MANUAL OF DANGEROUS INSECTS.

* Hypera meles Fabricius (Phytonomus).

(Austrian Alfalfa Leaf Weevil. Curculionidae; Coleoptera).

**Hosts:** Alfalfa, Gramineae.

**Injury:** Defoliates.

**Biology:** The larvae feed on the foliage and spin silken cocoons.

**Distribution:** Europe, and has been recently collected in the United States.

B. OTHER IMPORTANT ALFALFA PESTS.

COLEMBOLA.

Smyntinuridae.

*Smyntinus* sp., a springtail, is very injurious to alfalfa in New South Wales, when abundant skeletonizing the fields in moist seasons.

(A. Molineux, Agric. Gaz. N. S. Wales, Nov., 1896, pp. 807-809.)

ORTHOPTERA.

Gryllidae.

*Brachytripes achatinus* Stoll., a brown cricket of India. (See text fig. 2.)

LEPIDOPTERA.

Noctuidae.

*Prodenia litura* Fabricius, also known as the Egyptian cotton worm, attacks alfalfa in India.

*Plodia nigrisigna* Walker, attacks fruit in India.

*Chloridea obsolata* Hübner, the cotton bollworm; *Agrotis ipsilon* Rott., the greasy cutworm; and *Laphygma exigua* Hübner, serious pests already in the United States, attack alfalfa in India.

Tortricidae.

*Tortrix divisa* Walker, the lucerne moth of New South Wales; spins the heads together and feeds on them.

COLEOPTERA.

Coccinellidae.

*Subcoccinella 24-punctata* Linnæus; Europe; larvae and adults injure the foliage.

Cerambycidae.

*Chrysoperla flavata* Pall.; Russia, imported to United States in roots; root borer. (See text fig. 3.)

Curculionidae.

*Hypera punctata* Fabricius, the clover-leaf weevil of Europe, now common in the United States; also attacks alfalfa.

*Hypera postica* Gyllenhal, the alfalfa weevil of Europe, introduced into western United States, and very injurious. (See text fig. 4, a-f.)

*Apion mellotis* Kirby, a tiny weevil; Europe; breeds in the pith of the stems.

*Apion tenue* Kirby, a tiny weevil; Europe; breeds in stems.

**Fig. 1.—Chrotogonus trachypterus.** An Indian pest of alfalfa. (Maxwell-Lefroy.)

**Fig. 2.—Brachytripes achatinus.** An Indian pest of alfalfa. (Maxwell-Lefroy.)

**Fig. 3.—Chrysoperla flavata.** A Russian alfalfa root borer. (Original, Walton.)
Insektidæ.

*Asphondylia miki* Wachtl; gall midge; Europe, Arizona; forms galls in seed pods. (See text fig. 5.)

LITERATURE.


Sorauer, P. Handbuch der Pflanzenkrankheiten, 3d ed. vol. 3, 1913.

Bagaglì, P. Rassegna Biologica Rimofoi Europei, 1883-1887.


Webster, F. M. U. S. Dept. Agric., Bur. Entomology, Circ. 147, 1912.

DIPTERA.

Fig. 1.—Alfalfa weevil (*Hypoga postica*): a, Adults clustering on sprig of alfalfa; b, adult weevil; c, eggs; d, larva; e, cocoon; f, pupa. a, Natural size; b, d, e, f, much enlarged; c, greatly enlarged. (Webster.)

APPLE.

(*Malus malus*, etc. Family Rosaceæ.)

Fruit trees of America, Europe, and Asia, much cultivated in this country.

A. BETTER KNOWN APPLE INSECTS LIKELY TO BE IMPORTED.

termes australis Hagen.

(The Victorian White Ant. Termiteidæ; Isoptera.)

Hosts: Apples and other deciduous fruits, orange. Eucalyptus, vines, geraniums, timbers, furniture, books, etc.
Injury: Makes galleries in above plants and is also injurious to timbers in houses, furniture, etc.

Distribution: Australia.


Psylla mali Schmidle.

(The Apple Psylla, Psyllidae; Hemiptera.)

Hosts: Apple.


Description and biology: Adult 2.5–3 mm. long; color variable from greenish to brownish yellow (some show dark markings, with even red or yellow); wing veins greenish or greenish yellow. Nymphs flat, at first yellow or dirty yellow, with brown markings and red eyes, later becoming green all over; body partly covered with white or pale-blue curly waxy threads, and there is a long thread with a waxy globule. Eggs creamy yellow, but before hatching are faintly dusty red in color. The winter is passed in the egg stage, the eggs being placed on the spurs, around leaf scars, in cracks, among fine hairs, on the new wood, and elsewhere. The nymphs hatch in spring as the buds begin to open and attack the blossom and leaf buds, often destroying the blossoms and greatly stunting the shoots.

(See text fig. 6.)

Distribution: Europe, Central Russia
The Harlequin Fruit Bug.

The harlequin fruit bug (*Dinogynus versicolor*): Adults, nymphs, and injury to apple. (French.)
Apple Moths.

Fig. 1.—The apple pith moth (Blastodacna hellerella) and injury to twig and adult. Fig. 2.—The "figure-of-8 moth" (Diloba ceruleocephala.) Dorsal and lateral views of adult, and eggs (Theobald). Fig. 3.—The apple moth (Argyresthia conjugella). Adult, and injury to apple. (Beretining.)
The green hanging moth of the apple (Charagia lignivora): Adults, pupa, and larva in twig showing sawdust swelling. (French.)
Dindymus versicolor H.-S.
(Harlequin Fruit Bug. Pyrrhocoridae; Hemiptera.)

Hosts: Apple.
Injury: Disfigures apples by puncturing the skin in feeding.
Description and biology: Adult about 12 mm. long, orange red, black, and yellow in color. Nymphs of both sexes, when about half grown, are more highly colored than when mature. Eggs are deposited in late summer among rubbish, crevices of old posts, etc., or even in stubble. The newly hatched nymphs on hot days occur in swarms on many kinds of plants, on fences, and among rubbish. (See plate vi.)
Distribution: Australia.

French, C. Handbook of Destructive Insects of Victoria, 1891, pt. 1, p. 89.

Rhizoperta collaris Erichson.
(Apple-tree Borer. Bostrychidae; Coleoptera.)

Hosts: Apple.
Injury: Regarded as serious pest.
Description and biology: Adult length 4 to 6 mm. Adults bore into wood. Larva bores horizontal burrows into wood of trees; remains in tree after it is dead. Eggs are deposited in the holes bored in trees.
Distribution: Australia, Tasmania.

French, C. Handbook of Destructive Insects of Victoria, 1891, pt. 1, p. 61.

Phyllobius maecileornis Germar.
(Green Leaf Weevil. Brachyrhiniidae; Coleoptera.)

Hosts: Apple, pear, cherry, plum, nuts, oak, hawthorn, sloe, maple.
Description and biology: Adult length 12 mm.; brown; clothed with green or greenish scales; slightly hairy; antennae reddish, with black, clublike apices; legs black and brown. Occurs throughout May and June. Pupates in spring. Larva white, footless, curved, slightly hairy, with brown hairy head. Feeds on roots of various plants. Winters as larva. Eggs deposited in ground.
Distribution: Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 119.

Leptops hopei Schönherr.
(Apple-root Borer. Curculionidae; Coleoptera.)

Hosts: Apple, pear, cherry.
Description and biology: Adult length 25 mm.; light grayish brown. Occurs just before buds begin to swell. Disappears in December (Victoria). Pupates in ground. Larva length 25 mm.; whitish; tunnels roots of trees. Eggs deposited on upper sides of leaves, which have their edges glued together, hiding the eggs. Deposited in masses of 40 to 50. (See text fig. 7b.)
Distribution: Victoria.


Magdalis barbicorunis Latreille.
(Apple-stem Piercer. Curculionidae; Coleoptera.)

Hosts: Apple, quince, and medlar trees.
Injury: To twigs.
Description and biology: Adult length 2-2.5 mm.; black; neck-shield without knobs on sides; very thickly punctate, elytra strigose-punctate, the space between punctations ridged. Occurs in June. Pupates in gallery in twig under bark. Larva burrows in twig, by preference in bark, to the sapwood which is only slightly attacked: the bark becomes reddish-brown and sinks away.
**Distribution:** Europe.

Henschel, G. A. O. *Die Schädlichen Forst- und Obstbaum-Insekten,* 1895, p. 94.

**Anthonomus pomorum** Linnaeus.

(Apple-blossom Weevil. Curculionidae; Coleoptera.)

*Host:* Apple, pear.

*Injury:* Often very destructive to apple. Larva injurious to buds and blossoms; adult feeds on leaves.

*Description and biology:* Adult length 3 to 4 mm.; pitch black or fuscous black, with ashy pubescence; most easily recognized by pale V-shaped mark on elytra. Appear in late spring and live until next spring, when they copulate and oviposit. Hibernate in rubbish. *Pupa* yellowish brown. Pupates in withered flower bud. Pupation lasts 7 to 10 days. *Larva* length 4–5 mm.; white, footless, head brown; feeds in flower bud. Larval stage 8 days to 3 weeks. *Eggs* deposited in blossom buds. A single female deposits 50 or 60 during a period of 2 weeks. (See text figs. 7a, 8.)

*Distribution:* Europe.

APPLE INSECTS.

Cossus tristis Drury.

(Apple and Quince Borer. Cossidae; Lepidoptera.)

*Hosts:* Apple, quince, pear.

*Injury:* Bores in sapwood.

*Description and biology:* Adult occurs from September to November (South Africa). Broods may overlap. *Pupa* may be found in July and September. *Larva* length 50 mm.; wholly flesh-colored or mottled with red. Young larvae feed first beneath the bark; older larvae burrow in middle wood. *Eggs* deposited on bark, singly or in groups; especially in the fork of branches.

*Distribution:* South Africa.


Blastodacna putripennella Zeller.

(Apple Pith Moth. Elachistidae; Lepidoptera.)

*Host:* Apple.

*Injury:* Not seriously destructive.

*Description and biology:* Adult forewing brownish gray with golden and whitish spots and stripes; head gray; eyes white; antennae, gray ringed with white. Occurs in July and August (Germany). *Pupates* about end of June between dry leaves on dead twigs. *Larva* yellowish, with broad reddish segmental divisions; head, neck, anal shield, and feet dark brown; prolegs and a side stripe above the feet yellow. Hatches in autumn and feeds on leaves; on approach of winter bores into buds of 1-year-old twigs; in spring bores into pith of twig. *Eggs* are placed on leaves. (See text fig. 9.)


Blastodacna vinolentella H.-S.

(Pith Moth. Elachistidae; Lepidoptera.)

*Host:* Apple.

*Injury:* Considerable injury. Larva burrows into buds, shoots, and spurs.

*Description and biology:* Adult wing expanse a little less than 12 mm. Forewings may be almost black or may be marked with dark brown and rusty brown; inner margin white to beyond middle, where an irregular faint white oblique bar proceeds to tip of wing; two branches from which intersect black apical portion; hind wings gray and fringed; head black. Occurs in July and August. *Pupa* ochraceous; head, front of thorax, and tip of body, mahogony red; cylindrical in form; length 6 mm. *Larva* length 8 mm. Dull reddish brown with deep brown head and first thoracic segment. Larvae hatch in late summer, feed on leaves, bore into bud, pass the winter there, and mature in June. *Eggs* are unknown.

*Distribution:* England, Europe.

Theobald, F. V. Insect Pests of Fruit. 1909, p. 92.
Blastodacna hellerella Dup.

(Pth Moth. Elachistidae; Lepidoptera.)

This moth is similar to B. volucristella in habits and description, except that head of adult is white. (See plate vii, fig. 1.)

Theobald, F. V. Insect Pests of Fruit. 1909, p. 92.

Chloroclystis rectangulata Linnaeus.

(Green Pug Moth. Geometridae; Lepidoptera.)

Host. Apple.

Injury. Feeds on blossoms and young leaves. Not serious.

Description and biology: Adult wing expanse 18 mm.; forewings deep green with dark brown and gray bands; hind wings with similar greenish tinge. Flies in May, June, and July. Pupa thorax and wing cases yellow; caudal end deep red, tinged with olive. Larva pale yellowish green, with rusty red line down back; division between segments reddish; a line at sides yellowish green. Larvae appear in early spring. Pupate in earthen cocoon on ground. Eggs deposited on trees in early summer, where they remain over winter.

Distribution: Europe, England.

Theobald, F. V. Insect Pests of Fruit. 1909, p. 68.

Charagia lignitana Lewin.

(Green Hanging Moth of the Apple. Hepialidae; Lepidoptera.)

Hosts: Apple, acacia, aster, eucalyptus, etc.

Injury: Injuries confined largely to native trees; sometimes destructive to apple.

Bores in wood.

Description and biology: Adult male forewings pea-green, with silvery white markings; hind wings pale green; female forewings darker green than those of male, with purplish bands; hind wings orange pink. Larva pale pink, yellow or purplish yellow, head dark-brown. A "swelling" of sawdust covering covers burrow of larva. Eggs deposited on bark of tree. (See plate vii.)

Distribution: Victoria.

French, C. Handbook of Destructive Insects of Victoria, 1909, pt. 4, p. 77.

* Argyrestia conjugella Zeller.

(Apple Moth. Hyponomeutidae; Lepidoptera.)

Hosts: Apple, cherry, plum, whortleberry, mountain ash, service berry.

Injury: Serious to fruit.

Description and biology: Moth with front wings violet gray, sprinkled with lighter, with yellowish white stripe on the inner margin, and a whitish spot near apex. Larva with black head, body at first whitish, later fleshy red with many dark brown setigerous spots; 7 mm. long. Breeds in fruits. Pupates outside of the fruit in cocoons. (See plate vii, fig. 3.)

Distribution: Europe, British Columbia, Japan.


APPLE INSECTS.


(Apple and Cherry Ermine Moths. Hyponomeutidae; Lepidoptera.)

These two ermine moths, which are destructive fruit-tree pests, have recently been introduced into the United States, the one well treated in Technical Bulletin 24, of the Geneva, N. Y., Agricultural Experiment Station (1912), to which the reader is referred. (See text fig. 10.)

*Diloba caeruleocephala* Linneaus.

(Figure-of-8 Moth. Blue-head. Noctuidae; Lepidoptera.)

Hosts: Apple, plum, cherry.

Injury: Seldom serious; defoliation.

Description and biology: Adult wing expanse of male less than 25 mm., female 30 mm.; forewing grayish brown and brown, with a pale spot shaped like a figure 8 on each wing; hind wing grayish brown with darker ray-like lines and a dark wedge-shaped patch at the hinder angle. Occurs in September and October (England). Larva over 25 mm. long; head blue with two small black dots; body color varied, yellowish green or bluish gray, with broken yellow line along-side below spiracles; small black spots on segments. Larvae appear when leaves expand and are ready to spin up in June; pupate in crevices in bark and on limbs of trees. Eggs usually laid singly on shoots and spurs of fruit trees; they are round, flattened below, gray or grayish brown in color. (See plate vii, fig. 2.)

Distribution: England, Europe, and Asia Minor.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 35.

*Sesia myopaefornis* Bosc.

(The Apple Clearwing. Sesiidæ; Lepidoptera.)

Hosts: Apple, apricot.

Injury: Larvae work under bark.

Description and biology: Adult wing expanse 22 to 25 mm.; head, thorax, and abdomen black; male abdomen has red band above and white beneath; female has only a white edge underneath, with tail-like fan of black scales; wings transparent with dark scaled areas. Day-flying moths; occur in May, June, and July. (England). Pupa pale brown, protected by silken cases covered with chips. Larva length 15 mm.; dull yellowish white, head reddish brown; second thoracic segment with brown dorsal shield. Eggs laid on tree trunk. (See text fig. 12.)

Distribution: Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 17.
Tortrix ashworthana Newman.

(Light Brown Apple Moth. Tortricidae; Lepidoptera.)

Host: Apple. (A. Busck states that this species feeds on Acacia only.)

Injury: Very serious; attacks fruit in manner similar to codling moth.

Description and biology: Adult female wing expanse, 18 mm.; forewings light brown, slightly barred. Larva light green in color, seldom penetrates apple as far as seeds. Eggs deposited in calyx.

Distribution: Australia.


Fig. 11.—The apple sawfly (Hoplocampa testudinea). Adult and injured apples. (Theobald.)
Hoplocampa testudinea Klug.

(Apple Sawfly. Tenthredinidae: Hymenoptera.)

Host: Apple.

Injury: Local. Damages fruit.

Description and biology: Adult, female, length 6–8 mm.; reddish yellow, with a black patch on the head, another on thorax and on dorsum of abdomen; head and mesothorax punctured; antennae dusky in middle: male, slightly smaller. First brood occurs about apple-blossom time; second brood occurs in July. Pupate in soil. Larva, length 12 mm., creamy white; grub-like with brown head and a double, black chitinous plate on dorsum of anal segment; eats out cavities in interior of fruit. Many larvae migrate from one apple to another. Larval period in first brood 4 or 5 weeks. Winters as larva in second brood. Eggs are deposited in blossom. This stage varies from 8 to 14 days. (See text fig. 11.)

Distribution: Europe.


B. IMPORTANT APPLE INSECTS.

Coccidae:

Armored—

Aspidiotus (Diaspidius) africanus Marlatt; South Africa.

Diaspis pyri Colvée; Spain, Belgium, Denmark, France, Italy, Croatia, Austria, Switzerland, Tyrol.

*Epidiaspis piricola* Del Guercio.

France, Russia, Italy. (See Pear.)

*Leucaspis japonica* Cockerell; Japan.

*Parlatoria australis* Newstead; Algeria, Egypt.

*Parlatoria callanthina* Berlese and Leonardi; Italy, Spain, Victoria, and New South Wales.

*Parlatoria pyri* Marlatt; China; scale of female 1–1.25 mm. in length, oval; larval exuvia, purplish green, second exuvium dark olive, almost black. Apparently a dangerous pest.

Unarmored—

*Coccus hoferi* King; Switzerland.

*Lecanium bituberulatum* Targioni-Tozzetti; England, France, Sweden, Italy, Germany.

*Lecanium capric* Linnaeus; Europe, Nova Scotia.

*Lecanium gliandi* Kuwana; Japan.

*Lecanium persic* Fabricius; Europe, Australia, Canada.

*Lecanium pyri* Schrank; Europe, Prince Edwards Island.

*Lecanium rugosum* Signoret; France, Germany.

*Lecanium variegatum* Goethe; Europe.

*Lecanium vini* Bouche; Europe.

*Pseudococcus glaucus* Maskell; New Zealand.

FIG. 12.—The apple clearwing (*Sesia myopaformis*). Moth, cocoon, larva, and borings. (Reichelt.)

Tingitidae.

*Stephanitis pyri* Fabricius; Europe. (See Pear.)

Cerambycidae.

*Cerambyx scopolii* Fuessly; Europe; borer.

*Saperda scalaris* Linnaeus; Europe; borer.

*Liopus nebulosus* Linnaeus; Europe; borer.

Curculionidae.

*Magdalis cerasi* Linnaeus and *M. pruni* Linnaeus; Europe; breed under bark.

*Anthonomus incurvus* Panzer, *A. pedicarius* Linnaeus, and *A. pyri* Boheman; bud weevils; Europe.
Anthribidae.
   *Doticus pestilans* Oliff; Victoria: a pest of dried apples.

Scolytidae.
   *Scolytus pruni* Ratzéburg; Europe. (See Plum.)
   *Scolytus mali* Bechst.; Europe; galleries in bark.

Pyralidae.
   *Dictocoris punctiferalis* Guénet; Queensland. (See Corn.)

Lycaenidae.
   *Teia anartoides* Walker; Australia. (See Fruit.)

Lasiocampidae.
   *Gastropacha quercifolia* Linnaeus; Europe. (See Fruit.)
   *Chirimatobia brumata* Linnaeus.

Elachipteridae.
   *Coleophora anatipennella* Hübngr; Europe. (See Plum.)

Tenthredinidae.
   *Hoplocampa fulvicornis* Klug, sawfly; Europe; mines in fruit

Hymenoptera.

Tenthredinidae.
   *Ceratita capitata* Wiedemann. (See Fruit.)
   *Bactrocer a tryoni* Froggatt; Orient. (See Fruit.)
   *Bactrocer a cucurbitae*.

Diptera.

Trypetidae.
   *Capua aniustiorana* Haworth. (Small Apricot and Vine Moth. Tortricidae; Lepidoptera.)

Hosts: Apricot, vine, pear and a great variety of other trees. Attacks foliage and fruit clusters.

Injury: Does much harm to foliage of wall fruit.

Description and Biology: Adult wing expanse 12-18 mm.; female forewing reddish-ochreous, with a reddish brown basal patch forming an oblique streak and a reddish central spot; a costal spot is pale yellow; male wing grayish-ochreous with brown and black markings. Occurs from June until August. Pupation takes place among leaves. Larva length more than 12 mm.; color yellowish, or grayish green with pale spots from which arise hairs; occurs in greatest numbers in April and May; rolls leaf. Eggs deposited on twigs, hatching in spring.

Distribution: Europe, Asia Minor, Africa.


A. AN APRICOT PEST LIKELY TO BE IMPORTED.
   *Capua angustiorana* Haworth.

B. IMPORTANT APRICOT INSECTS.
   *Aspidiotus (Diaspidiotus) africanus* Marlatt; South Africa.
   *Ephediaspis piricola* Del Guercio; Germany, Italy, France, established in California.
   *Parlatoria calianthina* Berlese and Leonardi; Italy.

Unarmored—
   *Lecanium corihi* Linnaeus; Europe.
   *Lecanium kunoensis* Kuwana; China.
   *Lecanium prunastri* Fonscolombe; Europe, Japan.
   *Lecanium vini* Bouche; Europe.
INSECTS OF APRICOT, ARAUCARIA, ARBORVITÆ, ASH.

COLEOPTERA.

Cerambycidae.
Linognathus nebulosus Linnaeus; Europe; borer.

Scolytidae.
Scolytus amydali Guérin; Europe. (See Almond.)

Sesidae.
Sesia myopaeformis Bosc; Europe. (See Apple.)

Geometridae.
Lophodes sinistraria Guérin; Australia; defoliator.

DIPTERA.

Trypetidae.

LEPIDOPTERA.

Sesiidae.
Sesia myopaeformis Bosc.; Europe. (See Apple.)

ARAUCARIA.

(See Fruits.)

ARBORVITÆ.

(Thuya spp. Family Juniperaceæ.)

Small evergreen plants much used in horticulture.

IMPORTANT ARAUCARIA INSECTS.

HEMIPTERA.

Coccidae:

Unarmored—

Ctenochiton araucarix Green; Australia.

Eriococcus araucarix Maskell; Europe, Canary Islands, Brazil; Araucaria excelsa, A. bidwillii.

Eriococcus angulatus Froggatt; Australia; Araucaria excelsa.

Pseudococcus aurilatus Maskell; New Zealand, Australia, Auckland, Natal, Hawaiian Islands; Araucaria excelsa.

ARAUCARIA.

(Thuya spp. Family Conifera.)

Small evergreen plants much used in horticulture.

INSECTS INJURIOUS TO ARBORVITÆ.

HEMIPTERA.

Coccidae:

Armored—

Chinaspis striata Newstead; Egypt, Algeria, Arizona, California; attacks Thuya a'ricana.

Diaspis viarci Schrank; Europe; Thuya occidentalis.

Unarmored—

Lecanium avion Lindinger; Europe; Thuya occidentalis.

COLEOPTERA.

Scolytidae.

Phloeosinus thuya Perris; Europe.

BIBLIOGRAPHY

Lindinger, L. Die Schilfluse (Coccidae), 1912.
Eichhoff, W., Europ. Borkenkafer, 1881.

ASH.

(Prunus spp. Family Oleaceæ.)

Hardy ornamental trees growing in Europe, Asia, and America. These trees are important also for their timber. P. ursinus exudes a manna. Certain Chinese species yield the Chinese white wax. The various species are generally readily transplanted...
and hence will be found in nursery stock shipments. They are usually propagated from seed. As several species of insects breed in the seed, care must be taken about introducing seed for planting.

A. AN ASH PEST LIKELY TO BE IMPORTED.

Eriophyes fraxini Nalepa.

(ASH GALL MITE. Eriophyidae; Acarina.)

Host: Fraxinus excelsior, F. viridis.
Injury: Forms galls in flowers, fruit, and leaves. (See text fig. 13.)
Description and biology: Four-legged blister mite which causes galls by its feeding. Liable to introduction on nursery stock.
Distribution: Europe, Mexico.


B. OTHER IMPORTANT ASH INSECTS.

HEMIPTERA.

Aphididae.

Prociphilus bumelei Schranck, a gall-making louse of Europe, which attacks the tender leaves and petioles of ash and on its intermediate host, the fir, breeds at the roots. The form on fir roots has been known as Holzneria poschingeri Holzner.

Coccidae.

Aspidiotus (Chrysomphalus) nigropunctatus Cockerell; Mexico.

Chionaspis salicis Linnaeus, the willow scale; Europe; attacks Fraxinus excelsior and many other trees.
Parlatoria affinis Newstead; Algeria; attacks Fraxinus oxyphylla and olive.

Unarmored—
Fonscolombia fraxini Kaltenbach; Europe; attacks Fraxinus excelsior.

Orthoptera.

Oedipodidae.

Pachytylus migratorius Linnaeus, the migratory locust; Europe; injures many plants.

COLEOPTERA.

Cantharidae (Melolaelidae).

Lytta vesicatoria Linnaeus, the Spanish fly; all Europe; very injurious as adult.

Cerambycidae.

Cerambyx cerdo Linnaeus, the great oak borer; Europe; bores in wood. (See Oak.)

Scarabaeidae.

Melolontha hippocastani Fabricius, a May beetle; Europe; injures the roots of seedlings of various trees.
Melolontha melolontha Linnaeus, a May beetle; Europe; injures the roots of seedlings, and the adults attack the foliage.
INSECTS OF ASH AND ASPARAGUS.

Curculionidae.

Cionus fraxini De Geer, a small oval weevil; Europe; breeds externally on the leaves of ash and olive, pupates in cocoons on the leaf.

Scolytidae.

Hylesinus crenatus Fabricius, a bark beetle; Russia, Germany; bores the bark of ash and oak.

Hylesinus fraxini Panzer, a bark beetle; Europe; bores the branches and tops, attacking bark of ash, olive, and acacia.

Hylesinus olciperda Fabricius, a bark beetle; Europe; attacks ash and olive.

Scolytus scolytus Fabricius, a bark beetle; Europe; attacks bark, bast, and sapwood.

LEPIDOPTERA.

Cossidae.

Cossus cossus Linnaeus, a goat moth; Europe; bores in the wood. (See Willow.)

Zeuzera pyrina Linnaeus, a wood borer of Europe, Africa, North America. (See Horse-chestnut.)

Sesiidae.

Sesia spheciformis Grng., a clear-winged moth; Europe; bores in the wood.

Tortricidae.

Prays curtisellus Don., a grass-green larva, which occasionally attacks ash; Europe.

Hyponomeutidae.

Prays cissifolius Don., a small moth; Europe; larva mines leaves, skeletonizes, webs leaves, or mines buds, in its different generations.

Gracillaridae.

Gracillaria syringella Fabricius, a yellowish olive-brown moth: Europe (Sweden); larvae first mine the leaves and then roll them; attack also Syringa.

Hymenoptera.

Tenthredinidae.

Macrophya punctum-album Linneus, a saw-fly; England; very injurious.

LITERATURE.


ASPARAGUS.

(Asparagus officinalis Linneus. Family Liliaceae.)

Various other species of asparagus are cultivated for decorative purposes. The above-mentioned species is useful both for its delicious edible shoots and its graceful foliage. Pests introduced on any type of asparagus are likely to attack the cultivated crop.

A. BETTER KNOWN ASPARAGUS INSECTS LIKELY TO BE IMPORTED.

Crioceris spp.

(Asparagus Leaf Beetles. Chrysomelidae; Coleoptera.)

Species: *C. asparagi* Linneus; Europe, introduced into North America and widely distributed; asparagus. (See text fig. 14) A very important pest. *C. 12-punctata* Linneus; Europe, introduced into North America and widely distributed; aspara-
A MANUAL OF DANGEROUS INSECTS.

A very important pest. *C. meridigera* Linnaeus; Europe; onion, leek, garlic, lily of the valley, asparagus.

*Injury:* Feed on the stems of the asparagus and cause much injury, amounting often to thousands of dollars.

---

![Asparagus beetle](image)

Fig. 15.—Asparagus beetle (*Crioceris duodecim punctata*): *a*, Adult; *b*, larva; *c*, *d*, details of larval structure. (Chittenden.)

*Biology:* Eggs laid on plant. Larva feeds on stems and foliage. Pupates in soil. Two broods per annum.


---

![Asparagus miner](image)

Fig. 16.—Asparagus miner (*Agromyza simplex*): Adults. (Chittenden.)


*(Asparagus Miners. Agromyzidae; Diptera.)*

*Hosts:* Asparagus.

*Injury:* Mine immediately under the bark of the asparagus stem. The latter species has been introduced into the United States.

*Description and biology:* Adult fly very small. *Larva* white, legless. *Pupates* in mine. (See text figs. 16, 17.)
Distribution: A. maura; Hungary. A. simplex; Europe, North America.


Platyptera puci/optera Schrank.

(Asparagus Fly. Trypetidse; Diptera.)

Hosts: Asparagus.
Injmy: Mines the stems.

Description and biology: Fly dark brown, abdominal segments banded whitish; face, legs, and antennae reddish yellow; wings clear with a dark zigzag longitudinal band; length 6-8 mm. Maggot whitish, apical stigmatal plates shining black with two forward turned hooks; length 10 mm.

Distribution: Europe.


B. OTHER IMPORTANT ASPARAGUS PESTS.

HEMIPTERA.

Coccidae:

Armored—
Chionaspis berlesei Leonard; Europe; attacks Asparagus acutifolius and A. umbellatus.

COLEOPTERA.

Brachytoineae.
Coccus plagiatus Schall.; a weevil, causes serious injury in England.

LEPIDOPTERA.

Noctuidae.
Mamestra oleracea Linnaeus; Europe; larvae feed on plants. (See Cabbage.)

DIPTERA.

Anthomyiidae.
Chorophila cilicura Rondani; Europe; breeds in stems. (See Onion.)

ASSAM RUBBER.

(Ficus elastica. Family Urticaceae.)

Assam or India rubber is a native of Assam and the Malay region. It can be grown from cuttings or seed. As it belongs to the same genus of plants as the fig, its insects are treated under the discussion of that plant. (See Fig.)

ASSE1.

(Persea gratissima, etc. Family Lauraceae.)

This tropical American species is much prized for its large edible fruit, and is now cultivated extensively in Florida and southern California. Several other species of the genus are prized by the American trade for their evergreen foliage.
A MANUAL OF DANGEROUS INSECTS.

A. AN AVOCADO PEST LIKELY TO BE IMPORTED

Heliilus lauri Boheman.

(Avocado Weevil. Curculionidae; Coleoptera.)

Host: Fruit of Persea persica L. (Laurus drymifolia) and Persea pittieri Mez.

Injury: Larvae make galleries in the seed. Lia'le to be introduced in seed and fruit. Live specimens have been received in the United States.

Description: Adult weevil of a red ground color, with red femora, or dark brown with unicolorous legs and prominent patches of white scales; rostrum long, prothorax conical. The larvae breed in the seed and their presence is not easily detected. In the case of the recent introductions the seeds were planted and the injury was not noticed until faulty germination caused an examination.

Distribution: Mexico, Costa Rica. (See plate xl.)


B. OTHER IMPORTANT AVOCADO INSECTS.

HEMIPTERA.

Coccidae:

Aspidiotus (Pseudococcus) articulatus Morgan; Mexico (See Coffee). Scale of adult female 1 mm. in diameter, circular, reddish brown with central portion blackish, exuvia covered.

Aspidiotus (Chrysomphalus) persica Comstock; Mexico.

Aspidiotus persearum Cockerell; Hawaii; on Persea gratissima. Scale of female 1.25 mm. long, 1 mm. broad, brownish cream color, exuvia sublateral.

Aspidiotus (Chrysomphalus) personatus Comstock; West Indies, Mexico; Persea americana. (See Olive.)

Aspidiotus (Chrysomphalus) acuiformis Cockerell; Mexico, Central America. (See Citrus.)

Lepidosaphes longula Leonard; Java; scale of female about 2.35 mm. long, elongate, curved, narrow, coffee colored.

Pinaeaspis rhombica Leonard; Java; scale of adult female 1 mm. long, rhomboid, castaneous brown.

Pseudoparlatoria parlatorioidea Comstock; Brazil, Mexico; on Persea carolinensis. Scale of adult female about 1.4 mm. in diameter, light yellow, exuvia very large, extending from center of scale to margin, having the appearance of a Parlatoria.

Unarmored—

Ceroplastes cistidiformis Townsend and Cockerell; Mexico; wax scale. Adult female covered with dirty gray wax which is marked into plates; 6-8 mm. in length and 4.5 to 5.5 mm. in width.

Ceroplastes rubens Maskell; Australia, India, Ceylon, Hawaii. Adult female 2.2-6 mm. in length, covered with wax which is rather thick and dull red or pinkish throughout.

Icerya montserratensis Riley and Howard; Mexico. (See Citrus.)

Pseudococcus virgatus Cockerell; Isle of Pines.

Pulvinaria mameza Maskell; Hawaii, Natal; on Persea persica. Adult female reddish brown covered with a thin grayish meal, ovisac large, snow white, irregular, forming a mass of loose cotton.

Pulvinaria simulans Cockerell; Mexico.

LEPIDOPTERA.

Lascocampidae.

Suana concolor Walker; Java, defoliator.

Cossidae.

Zeuzera coffeae Nietzer; India, Ceylon, Java, East Africa, Kamerun. (See Coffee.)

COLEOPTERA.

Bostrychidae.

Apate monachus Fabricius; Africa, West Indies. (See Citrus.)

Brachyrhinidae.

Dispros abbreviatus Linnaeus; West Indies. (See Sugar cane.)

Calanidae.

* Canthophilus tatinus Say; Florida, probably imported; bores in seed.

DIPITERA.

Trypetidae.

Ceratitis capitata Wiedemann; attacks Persea persica. (See Fruit.)
BAMBOO INSECTS.

BAMBOO.

(Bambusa spp.; Dendrocalamus strictus, etc.; Arundinaria spp.; Cephalostachyum gracile; Melocanna bambusoides; Phyllostachys spp. Family Bambuseae.) Treelike grasses much used in cultivation.

A. BETTER KNOWN BAMBOO INSECTS LIKELY TO BE IMPORTED.

Dinoderus minutus Fabr.

(Smaller Bamboo Shot-hole Borer. Bostrychidae; Coleoptera.)

*Hosts*: Bamboo (*Dendrocalamus strictus* and *Bambusa*).

*Injury*: Commonly found attacking bamboos and is also found in cut sugar cane.

*Description and biology*: Beetle brown, shining, 2.5 mm. long, with black head and thorax, the bases of elytra lighter colored, occasionally almost reddish. *Larva* pale canary yellow, opaque, curved; head small orange brown with black mandibles; legs three-jointed. Length 3 mm. Bores in the bamboos. (See text figs. 18, 19.)

*Distribution*: India.

Stebbing, E. P. Indian Forest Insects, Coleoptera, 1914, pp. 133-143, pl. 9.

Dinoderus pilifrons Lesue.

(Booby Shot-hole Borer. Bostrychidae; Coleoptera.)

*Hosts*: Bamboo (*Dendrocalamus strictus*), various kinds of wood.

*Injury*: Bores in bamboos.
Description and biology: Adult reddish brown, 3.3 mm. long, appendages and lateral edges of abdomen lighter colored. Larva yellowish white, mouth parts brownish, mandibles black; length 3.2 mm. Pupa with yellow abdomen, wings white, head and prothorax dirty white.

Distribution: India.

Stebbing, E. P. Indian Forest Insects, Coleoptera, 1914, pp. 130-133, fig. 89, pi. 131.

_Eucosoma paragramma_ Meyrick.

(Bamboo Borer. Tortricidae; Lepidoptera.)

Host: Bamboo.

Biology: Caterpillar bores in the stem of green bamboo, pupates in tunnel.

Distribution: India.


_Ceratitis striata_ Froegatt.

(Bamboo Fruit Fly. Trypetidae; Diptera.)

Host: Bamboo shoots.

Injury: Larvae feed in decayed shoots of bamboo.

Description: Adult length 5-6 mm., color pale yellow to grayish with upper surface of thorax variegated with black.

(See plate xxvi, fig. a.)

Distribution: Ceylon.


**B. IMPORTANT BAMBOO INSECTS.**

_HEMIPTERA._

_Coccidae:

Armored—

_Aspidiotus (Odonaspis) bambusarum_ Cockerell; Japan.

_Aspidiotus (Odonaspis) canaliculata_ Green; Ceylon.

_Aspidiotus (Odonaspis) imusitata_ Green; Japan, Ceylon; Arundinaria, Phyllostachys bambusoides.

*Aspidiotus (Odonaspis) secreta_ Cockerell; Hawaii, Japan; _Bambusa and Arundinaria_. Has been taken in quarantine at San Francisco.

_Aspidiotus (Odonaspis) secreta saccharicaulis_ Zehntner; Java.

_Aulacaspis javanica_ Newstead; East Java.

_Chionaspis arundinaria_ Green; Ceylon; Arundinaria.

_Chionaspis bambusce_ Cockerell; Japan.

_Chionaspis colemani_ Kuwana; Japan; Phyllostachys bambusoides.

_Chionaspis clongata_ Green; Ceylon.

_Chionaspis graminis_ Green; Ceylon, Japan. (See Pl. II, fig. 1.)

_Chionaspis hikoosui_ Kuwana; Japan; Phyllostachys bambusoides.

_Chionaspis simplex_ Green; Ceylon.

_Fiorinia bambusae_ Maskell; Hongkong, China; _Bambusa fortunec._

_Fiorinia diasipiformis_ Newstead; Java.

_Fiorinia signata_ Maskell; Japan; _Bambusa tesselata._

_Fiorinia tenuiis_ Maskell; Japan; _Bambusa._

_Hemichionaspis serobicolorum_ Green; Ceylon.

_Lepidosaphes bambusica_ Cockerell; Brazil.

_Lecucaspis bambusae_ Kuwana; Japan; _Phyllostachys._

*Leucaspis japonica_ Cockerell; Japan.

_Pinnaspis bambusae_ Cockerell; Jamaica.

Fig. 19.—_Dinoderus minutus_. Injury to bamboo stalks. (Stebbing.)
The Bamboo Borer.

The bamboo borer (*Cyrtotrachelus longipes*): Adults, eggs, larva, cocoon, injury. (Stebbing.)
INSECTS OF BAMBOO AND BANANA.

COCCIDAE.—Continued.

Unarmored—

*Aclerda distorta* Green; Ceylon.
*Aclerda japonica* Cockerell; England (in greenhouses); *Arundinaria japonica*.
*Aclerda tokionia* Cockerell; Japan; *Bambusa*.
*Antonina socialis* Newstead; England (in greenhouses); *Arundinaria japonica*.

*Antonina crassifolia* Cockerell; Japan; California; New Jersey.

*Asterolecanium bambuse* Boisduval; Guatemala; Florida; *Bambusa viridis*, *Bambusa viridi-stricta*.
*Asterolecanium coronatum* Green; Ceylon; *Dendrocalamus giganteus*.
*Asterolecanium solenophoroides* Green; Ceylon.
*Asterolecanium exiguum* Green; Ceylon, Hawaiian Islands.
*Asterolecanium flavociliatum* Green; Ceylon; *Arundinaria*.
*Asterolecanium lanceolatum* Green; Ceylon; *Arundinaria*.
*Asterolecanium miliaris* Boisduval; Ceylon, Cuba, Algeria, Mauritius, Brazil, Jamaica, Trinidad; *Bambusa vulgaris*, *B. distorta*, *B. oliveriana*.
*Asterolecanium pudibundum* Green; Ceylon.
*Asterolecanium rubrocomatum* Green; Ceylon.
*Asterolecanium tenuissimum* Green; Ceylon.
*Asterolecanium tumidum* Green; Ceylon.
*Asterolecanium udogamus* Green; Ceylon.
*Asterolecanium bambusicolor* Kuwana; Japan.
*Asterolecanium hemisphaericum* Kuwana; Japan.
*Asterolecanium mansii* Kuwana; Japan.
*Ceroplastes theobromae* Newstead; Cameroon.

*Chelococcus bambuse* Maskell; Hawaii, Ceylon, India, Mauritius, Brazil; *Bambusa tulda*.
*Coccus arundinariae* Green; Ceylon; *Arundinaria*.
*Eriococcus graminis* Maskell; China, Japan.
*Eriococcus onukii* Kuwana; China, Japan; *Arundinaria hindsii* var. *graminze*.

Pentatomidae.

*Oecophora montana*, a sucking bug; India; feeds in all stages on the seeds of bamboo (*Dendrocalamus strictus*).

COLEOPTERA.

Bostrychidae.

*Fourgeopholis parallela*; India; bores in wood of *Dendrocalamus strictus*.

*Dinoderus brevis* Horn; India; United States; very important bores in the stalks of *Dendrocalamus strictus*.

*Heterobostrychus unicornis* Waterhouse; *Sinoxylon anale* Lesne; bores in bamboos of *Dendrocalamus strictus*.

*Dinoderus distinctus* Lesne; India; bores bamboos. (See Mango.)

Lyctidae.

*Lyctus spinifrons* Lesne; India; bores in bamboos of *Dendrocalamus strictus*.

Cucujidae.

*Psammocus trimaculatus* Motschulsky; India; bores in wood of *Dendrocalamus strictus*.

Tenebrionidae.

*Trichitium confusum* Duval, and *T. castaneum* Herbst; India; bores in wood of *Dendrocalamus strictus*.

Chrysomelidae.

*Estigmena chintensis* Hope; India; bores in young stems of *Dendrocalamus strictus* and *Ophiostoma* *americana* *per gracile*.

Cerambycidae.

*Stromatium barbatum* Fabricius; India; bores in *Dendrocalamus strictus*.

Curculionidae.

*Cytorchrus dux* Bohemen; India; bores in tops and shoots of *Dendrocalamus hamiltonii*.
*Cytotrichus longipes* Fabricius; India; bores in *Melocanna bambusoides*. (See plate IX.)

Cossidae.

*Conarthrus affinis* Wollaston; India; bores in bamboos of *Dendrocalamus strictus*.

LITERATURE.

STEERING, E. F. A Manual of Forest Zoology for India, 1908.
STEERING, E. F. Indian Forest Insects, 1914.

BANANA; PLANTAIN.

(Musa spp. (especially paradisiaca). Family Musaceae.)

Bananas and plantain have become a very important article of commerce, being mainly imported from the West Indies and Central America. Since the plant can

278-12—18—3
only be propagated from suckers or sprouts there is danger of introducing pests into the country in this manner. The banana is grown very extensively in the Southern States as a hedge plant. The compact nature of the fruit bunches makes it possible for many insects of considerable size to find entrance into the country in the bunches as well as in the fruit itself.

A. BETTER KNOWN BANANA PESTS LIKELY TO BE IMPORTED.

Cosmopolites sordidus Germar (Sphenophorus.)

(Banana Root Borer. Calandridae; Coleoptera.)

Hosts: Banana (all varieties), sugar cane.

Injury: Serious pest to young banana plants in Fiji.

Description and biology: Adult 14 mm. in length, 4 mm. in breadth, color dark brown to black, head with prominent rostrum, antennae el' owed. Pupa soft and white when newly formed. Pupal stage lasts from 6 to 8 days in the bulb. Larva 20 mm. in length, 8 mm. in breadth, cream colored, footless, and requires about 20 days to reach pupal stage. Eggs presumably deposited singly on base of stem near the crown. The larvae, upon hatching, work their way inward and down toward the base.

Distribution: Fiji, British New Guinea. [In eastern hemisphere South Pacific Ocean to Indian Archipelago.] Jamaica, India, Brazil.


Dacus curtipennis Froggatt.

(Banana Fruit Fly. Trypetidæ; Diptera.)

Host: Banana.

Injury: Breeds in fruit.

Description: Adult about 6 mm. long; head yellow; thorax with elongate lar of silvery white; legs yellow; tarsi and hind femora darker; abdomen elongate with base and two narrow transverse black bands below, sheath and ovipositor elongate. (See plate xxviii, figs. b, d.)

Distribution: Fiji.


B. OTHER IMPORTANT BANANA INSECTS.

HEMIPTERA.

Aleyrodidae.

Aleurodicus cocus Curtis: West Indies, Mexico, Central and South America. (See Coconunt.)

Coccidae.

Pseudococcus grassii Leonard; Italy.

COLEOPTERA.

Calandridae.

Rhadoecnemis obscurus Boisduval. (See Sugar cane.)

LEPIDOPTERA.

Pyralidae.

Dichocrocis punctiferalis Guenée; Queensland. (See Corn.)

Castniidæ.

Castnia licus Drury; South America. (See Sugar cane.)

Tineidæ.

Ereunetis flavistrata Walsingham; Hawaii. (See Sugar cane.)

DIPTERA.

Trypetidæ.

Ceratitis capitata Wiedemann. (See Fruit.)

Rioa masar Froggatt; Australia. (See Fruit.)

Bactrocera tryoni Froggatt; Orient. (See Fruit.)
INSECTS OF BARLEY, BAY, AND BEAN.

BARLEY.

(Hordeum vulgare. Family Gramineae.)

Barley is a grain with many varieties grown in various parts of the world, especially Europe and Asia. There is danger of importing pests of the grain only, unless the straw should be used for packing. Its pests are discussed under Grains and Grasses.

BAY.

(Laurus spp. Family Lauraceae.)

Evergreen plants much cultivated for their shrubbery.

INSECTS ATTACKING BAY TREES.

HEMIPTERA.

Coccidae:

Armored—

*Aspidiotus britannicus* Newstead; Europe.

*Aspidiotus (Aonidia) lauri* Bouche; Germany, Australia, Greece, Italy, Spain, Portugal; *Laurus canariensis*.

*Aspidiotus (Chrysomphalus) paulistus* Hempel; Brazil.

*Aspidiotus (Chrysomphalus) scutiformis* Cockerell; Mexico, Central America.

*Crypsaspis* *ditodes* Lindinger; Canary Islands; *Laurus canariensis*.

*Parlatoria calianthina* Berlese & Leonardi; Italy.

Unarmored—

*Coccus acuminatus* Signoret; Hawaii, Ceylon, France.

*Eucalymnatus brunfelsi* Hempel; Brazil; *Laurus camphora*.

*Icerya montserratensis* Riley & Howard; West Indies, Mexico; *Laurus camphora*.

*Paralecanium planum* Lindinger; Canary Islands; *Laurus canariensis*.

*Platinglisia noacki* Cockerell; Brazil.

*Pseudococcus indicus* Signoret; France; *Laurus indicus*.

*Pseudococcus laurinus* Boisduval; France; *Laurus nobilis*.

*Pulexina variabilis* Lindinger; Canary Islands; *Laurus canariensis*.

BEAN.

(Phaseolus vulgaris. Family Leguminose.)

This species includes the kidney, common field, garden, snap, and string beans. It is probably of tropical American origin. The beans are an article of commerce and very likely to introduce pests.

BROAD BEAN.

(Vicia faba. Family Leguminose.)

The broad bean is a native of Asia, but is grown extensively in Europe and North America, especially as a food for domestic animals and for human consumption. The beans are an article of commerce and quite likely to introduce pests.

LIMA BEAN.

(Phaseolus lunatus. Family Leguminose.)

The lima or sugar beans are native to South America. They are articles of commerce and quite likely to introduce pests.

A. BETTER KNOWN BEAN INSECTS LIKELY TO BE IMPORTED.

*Mylabris* (Bruchus) spp., etc.

(Bean and Pea Weevils. Mylabridae [Bruchidae]. Coleoptera.)

Many of the weevils attacking beans are cosmopolitan and have been introduced into the United States. The fact that they breed in perfectly dry stored beans makes their distribution very easy.
Species: *M. loti* Paykull; seed of *Lotus* and *Lathyrus*. *M. atomarius* Linnaeus; very common; *Vicia faba*, *Lathyrus*, *Vicia sepimi*, etc. *M. rufimanus* Boheman; Europe, North Africa, Egypt, Persia, Syria, introduced into California; beans, peas. An important pest. *M. affinis* Förlichs; France, imported into Ireland and East Indies; beans. *M. pisorum* Linnaeus; distributed from Orient until now cosmopolitan; a very serious pest; peas, *Vicia, Cytisus laburnum*. (See text fig. 20.) *M. lentis* Frölich; Europe, Egypt, Syria, lentils. *

*^- Pachymerus chinensis* Linnaeus; now almost cosmopolitan; cowpeas, *Phaseolus radiatus*, *Cajanus indicus*, peas, lentils, beans, *Dolichos*,* sorghum*. (See text fig. 22.) *P. quadrimaculatus* Fabricius; now almost cosmopolitan; cowpeas, peas, beans. (See text fig. 23.)

Description: These weevils are small, somewhat flattened, rounded or oblong, with head concealed beneath. The larvae breed in the seed of beans and peas and pupate there.


**Spermophagus pectoralis** Sharp.

(Mexican bean weevil. Mylabridae; Coleoptera.)

Host: Beans.

Injury: To dried beans, which it destroys for successive generations like the common bean weevil.

Description: A small black rounded beetle with white marks on the elytra or wing-covers.

Distribution: Mexico, Guatemala, Nicaragua, Panama, Brazil, Texas.

Agromyza phaseoli.

(Bean Fly. Agromyzidae; Diptera.)

Hosts: Lima, Tonga, French, and Madagascar beans.

Injury: Larvae bore in stalks.

Distribution: Australia.

Froggatt, W. W. Agricultural Gazette, N. S. W. Feb., 1911.


Lycæna bactica.

(Blue or Hairstreak Butterfly. Lycænidae; Lepidoptera.)

Hosts: Beans, garden peas, cowpeas, Jack beans, crotalarias, and pigeon peas.

Injury: Larvae attack pods, devouring growing seeds.

Distribution: Hawaii.


Hyalocephalus pellicularius.

(Hawaiian leaf-hug. Capsidae; Heteroptera.)

Host: Pigeon peas.

Injury: By sucking juices from plants.

Distribution: Hawaii.


Zizera labradus Godt.

(Victoria Bean Butterfly. Lycaenidae; Lepidoptera.)

Hosts: Beans, peas.

Injury: Feeds in the pods, a serious pest in Victoria.

Description: Butterfly one of the group known as "Blues." Larva flattened, green, very hairy. Egg circular, pitted.

Distribution: Australia.


Maruca testulalis Geyer.

(Bean Pod Borer. Pyralidae; Lepidoptera.)

Hosts: Mung (Phaseolus mungo), moth (Phaseolus aconitifolius), tur (Cajanus indicus).

Injury: Breeds in the pods of legumes.

Description and biology: Adult wing expanse 26-30 mm., fuscous brown, forewing with conspicuous black edged white spot, hind wing white, with a marginal fuscous band. Larva 12 mm. long, green; sometimes with a pink tinge, hairs on small black tubercles. Bores inside of the pods and pupates in its borings.

Distribution: Australia and Asia.

B. OTHER IMPORTANT BEAN INSECTS.

**COLEOPTERA.**

Chrysomelidae.
- *Cerotoma denticornis* Olivier, leaf beetle; Porto Rico (see text fig. 24).

Cauroniionidae:
- *Sitona lineata* Linneus; S. flavescens Marsh.; Europe. (See Clover.)
- *Hypera variabilis* Herbst; Europe. (See Clover.)

**DIPTERA.**

Trypetidae.
- *Dacus cucurbitae* Coquillett; India, Ceylon, Hawaii; attacks fruit. (See Cucurbits).
- *Ceratitis capitata* Wiedemann; attacks *Phaseolus vulgaris*. (See Fruit.)
- *Bactrocera cucurbita.*
- *Bactrocera tryoni.*

Anthomyiidae.
- *ChoTlophila (Pegomya) fusciceps* Zetterstedt. (See Corn.)

Agromyzidae.
- *Agromyza fabalis* Jack; bean stem maggot, Rhodesia, mines stems of cowpeas, French beans, kidney and haricot beans.

**LEPIDOPTERA.**

Hesperidae.
- *Eudamus proteus* Linnaeus, bean leaf roller; Porto Rico; Southern States.

---

**BEECH.**

(*Fagus* spp. Family *Fagaceae.*)

This genus contains tall, hardy, deciduous trees favored for parks. The wood is valuable and the nuts edible. The nuts also yield an oil used for cooking. Propagated from seed. Valuable for nursery stock.

A. BEECH PESTS LIKELY TO BE IMPORTED.

- *Laspeyresia grossana* Haworth. (Carpocapsa.)

(Beech Tortrix. Tortricidae; Lepidoptera.)

*Hosts:* Hazelnut, walnut, oak, beech, chestnut.


*Description and biology:* Adult, forewing bluish ash-gray; translucent spot brownish gold streaked with black, brown at base, bounded by triangular spots. Flies in June and July (Germany). *Pupates* in spring in the earth. *Larva* attacks nuts in late summer, winters in earth.

*Distribution:* Europe.

B. OTHER IMPORTANT BEECH PESTS.

HEMIPTERA.

 Aphididae.

 Pterochlorus exsicator Altum, a nonmigratory plant louse; middle Europe; very injurious to the twigs and stems of young trees.

 *Phyllaphis fagi Linnaeus, nonmigratory plant louse; Europe; feeds on foliage.

Coccidae:

 Unarmored—

 Colostromia assimilis Maskell; New Zealand; attacks Fagus menziesii and F. fusca.

 Colostromia pilosa Maskell; New Zealand.

 Cryptococcus fagi Baerenstanz; Europe; Fagus sylvatica.

 Eriococcus drisi Sigmori; Europe; Fagus silvatica.

 Eriococcus fagi-corticus Maskell; New Zealand; Fagus fusca.

 Eriococcus pallidus Maskell; New Zealand; Fagus fagifolia.

 Eriococcus raithygi Maskell; New Zealand; Fagus menziesii.

 Gossyparia carrelli Maskell; New Zealand; Fagus menziesii.

 Inplania fagi Maskell; New Zealand.

 Phenacoleachia zealandica Maskell; New Zealand.

 Pulexius fagi varia Maskell; Europe; Fagus sylvatica.

 Rhizococcus intermedius Maskell; New Zealand; Fagus menziesii.

 Rhizococcus palchellus Maskell; New Zealand; Fagus fusca, F. menziesii, F. cliftonioides.

 Rhizococcus totarz Maskell; New Zealand; Fagus menziesii.

 Ripersia fagi Maskell; New Zealand; Fagus menziesii.

 Solenococcus fagi Maskell; New Zealand.

 COLEOPTERA.

 Anobiidae.

 Xestobium plumbeum Illiger; Europe; injures wood for technical purposes.

 Xestobium rufiportulae De Geer; Europe; injures wood for technical purposes.

 Ptinus pentinicornis Linnaeus; Europe; bores in wood.

Elateridae.

 Athous subsalis Müller, a sniping beetle; Europe; larvae destroy germinating beech.

 Lymexyliidae.

 Hylecoccus dermestoides Linnaeus; Europe; breeds in bark and wood.

 Scarabaeidae.

 Amphimallon solstitialis Linnaeus; Europe; develops like the June beetle at the roots of trees.

 Melolontha hippocastani Fabricius, and M. melolontha Linnaeus; Europe; also breed at the roots of seedlings and as adults feed on the foliage.

 Polyphila fullo Linnaeus; Europe; breeds at the roots of trees and the adults feed on the foliage.

 Buprestidae.

 Agrilus angustalus Illiger, A. biguttatus Fabricius, A. elongatus Herbst, and *A. viridis Linnaeus (see Oak); wood borers; Europe; attack bast and sapwood, especially of young trees.

 Cerambycidae.

 Callidium xanum DeGeer; and C. violaceum Linnaeus; long-horned wood borers; Germany; attack wood of felled trees and lumber.

 Saperda scalaris Linnaeus; Europe; bores in wood. (See Poplar.)

 Chrysochidae.

 Haltica quercortorum Foudr.; a leaf beetle; Germany. (See Oak.)

 Brachyrhinidae.

 Strophosoma capitata De Geer, and S. melanogramma Forster, weevils; Europe; adults feed on the leaves and buds of seedlings.

 Polygraphus cervinus Linnaeus, P. chrysoelma Olivier, P. griseosaculatus Desbrochers, P. lateralis Gyllenhall, P. micans Schönherr, P. mollis Stroem, P. picus Fabricius,* P. sericus Schall., and * P. viridicollis Baudi, weevils; Europe; as adults feed on buds and foliage; probably breed at the roots

 The two latter species have been introduced into the United States.

 Phyllobius argenteus Linnaeus, P. urticae De Geer and P. viridicollis Fabricius; weevils; Europe; adults injure buds and leaves.

 Attelabidae.

 Apoderus coryst Linnaeus, a leaf rolling weevil, Europe; larvae breeds in the leaf rolls.

 Rhynchites oliv Müller and Rhynchites betuleae Linnaeus, leaf rolling weevils; Europe; larvae breed in the leaf rolls.

 Bytiscus betulae Linnaeus, a leaf rolling weevil; Europe.
Curculionidae.

Orchestra fagi Linnaeus, a small jumping weevil; Europe; mines the leaves.

Hylolois abietis Linnaeus, a large weevil; Europe; bores in the bark of seedlings.

Cossidae.

Rhyncholus lignarius Marsh., a small elongate weevil; Europe; bores in the trunks.

Rhyncholus truncorum German, a small weevil; Europe; bores in timber.

Scolytidae. 

Scolytus intricatus Ratzeburg; Russia, Germany; makes galleries in bast.

Anisandrus dispar Fabricius; Germany; makes galleries in wood, causing great damage.

Ernopus fagi Fabricius; Europe; makes galleries in bark of Fagus sylvatica.

Taphryochus bicolor Herbst, and T. vilifrons Dufour; Europe; make galleries in bark.

Xyleborus dryographus Ratzeburg, and X. monographus Fabricius; Europe; makes galleries in the wood of living trees.

Xyleborus domesticus Linnaeus, and X. signatus Fabricius; Europe; makes galleries in sapwood of branches and in the wood of the trees.

LEPIDOPTERA.

Cossidae.

Zeuzera pyrina Linnaeus; Europe, Africa, North America; breeds in the wood. (See Horse-chestnut.)

Cossus cossus Linnaeus; the goat moth; Europe; breeds in the wood. (See Willow.)

Drepanidae.

Drepana carteri Fabricius; Europe; defoliator.

Notodontidae.

Phaleta bucephala Linnaeus; Europe. (See Forests.)

Geometridae.

Chelina boreata Hübnner; Germany; feeds on young growth.

Hibernia aurantiaria Esp., H. defoliaria Linnaeus and H. marginaria Borchh.; Europe; feed on foliage. Larentia dilutata Borchh.; Europe; feeds on foliage.

Lasiocampidae.

Malacosoma neustria Linnaeus; Europe; feeds on buds and leaves (see Forests).

Lymantriidae.


Noctuidae.

Acreonetta acris Linnaeus; Europe; defoliator.

Scopelosoma satellitii Linnaeus; Germany; injurious to young growth.

Plutellidae.

Crostoma parenthesella Linnaeus; Europe; attacks leaves of seedlings.

Tortricidae.

*Peronea ferrugana Treitschke; Europe; North America; attacks leaves. Tortrix podana Sc.; Europe; attacks leaves of seedlings.

HYMENOPTERA.

Cimbicidae.

Cimber fagi Zadd.; sawfly; Europe; feeds on foliage.

Xiphydriidae.

Xiphydria camels Linnaeus; wood wasp; Europe; bores in wood.

DIPTERA.

Hormomyia annulipes Htg. and H. fagi Htg., gall midges, Europe; from galls on leaves.

LITERATURE.


Lindenger, L. Die Schbildäuse (Coccidae), 1912.

Bargagli, P. Rassegna Biologica Rincolori Europei, 1883-1887.

BEET INSECTS.

41

BEET; MANGELWURZEL OR MANGOLD; SUGAR BEET; CHARD.

(Beta vulgaris Linnaeus. Family Chenopodiaceae.)

The beet and its varieties are grown from seed. The varieties have been developed either for their roots or their foliage, which are edible. A race of showy foliage beets has been developed which make excellent flower-garden borders. The species occurs in America, Europe, and as far east as Persia, and the Caspian Sea. Insects are most likely to be introduced in shipments of beet roots.

A. BETTER KNOWN BEET INSECTS LIKELY TO BE IMPORTED.

Atomaria linearis Stephens.

*Hosts:* Mangolds, beets, sugar beets.

*Injury:* Very destructive by destroying sprouts at time of germination and later attacking both roots and leaves.

*Description:* Beettle 1–1.5 mm. long, dark brown, with fine pubescence. The life history has not been worked out.

*Distribution:* Europe (England).


Jablonowski, Jozsep. Die Tierischen Feinde der Zuckerrübe (translation by Julius Reitzer), 1909, pp. 136-142, fig. 31.

* Cassida nebulosa Linnaeus.

Host: Beets Tortoise Beetle. Cassididae; Coleoptera.)

*Host:* Beets, sugar beet. orache, lambsquarter, Atriplex, etc.

*Injury:* Both larva and adult feed on the foliage.

*Description:* Beetle dorsally flattened in the shape of a tortoise shell, about 6 mm. long, yellowish gray or pale green.

*Distribution:* Europe, Asia (Persia to Siberia), and recorded from California in 1894.


Cleonus punctiventris Germar.

*Hosts:* Beets Root Weevil. Curculionidae; Coleoptera.)

*Hosts:* Beets, Polygonum, thistle, goosefoot, tobacco, Salsola.

*Injury:* Adults feed on young plants; larva feed at the roots of beets. Very destructive in east Europe.

*Description and biology:* An elongate subcylindrical weevil with stout beak. The larva feed at roots as low as 60 cm. below the surface. Pupate in the larval feeding places.

*Distribution:* Europe.


Gelechia ocellatella Boyd; Gelechia atriplicella F. R.; Gelechia instabilella Douglas. (Lita.)

*Hosts:* Beets, sugar beets, mangolds.

*Injury:* Mine the leaves, and sometimes G. ocellatella bores in the crown and a short distance into the roots.
Description and biology: *G. ocellatella* is a small yellowish gray moth with dark ribs and an apical spot on the front wings; hind wings as large as front and whitish gray; pupates in leaf rolls, in the roots or outside. Larva 10 to 12 mm. long, pale greenish with a transverse row of reddish spots on each segment and two or three longitudinal rose colored stripes. Feeds on leaves and for a short distance into the roots.

**Distribution:** Europe.


*Hymenia fascialis* Cramer.

(Hawaiian Beet Webworm. Pyralidae; Lepidoptera.)

**Hosts:** Sugar beet, Swiss chard, mangel-wurzel, *Amaranthus, Euxolus,* purslane (*Portulaca oleracea*), cucumber, Chenopodiaceae.

**Injury:** Capable of doing considerable damage to truck by feeding on foliage. Has been widely distributed. (See text figs. 25, 26.)

**Distribution:** Japan, Hawaii, Tropical America, Porto Rico, Europe, South Africa, Australia, Madagascar, Reunion, Mauritius, Florida, Alabama, California, District of Columbia.


*Chortophila* (Pegomya) *hyoscyami* Panzer. (*Phorbia vicina* Linth.)

(Beet fly or spinach leafminer. Anthomyidae; Diptera.)

**Hosts:** Spinach, beets, sugar beets, mangolds, orache, henbane, goosefoot.

**Injury:** Mines leaves. The mines are blisterlike.

Description and biology. Fly thorax lead gray, with five faint dorsal stripes. abdomen yellow gray with a faint brownish stripe; entire body with black bristles; head silver white, with reddish shimmer; front and scutellum with orange, silver gray streaks; eyes red; palpi yellow with dark apex; femora yellowish, tibiae brown; length, 6 mm. The species varies in color and has received a number of names.

**Distribution:** Europe. Introduced into the United States and quite injurious to spinach.


**Ormerod, Miss E.** Manual Injurious Insects, 1890, pt. 1, pp. 144-147, fig. (*P. betae* Curt.).

B. OTHER IMPORTANT BEET INSECTS.

ACARINA.

**Tetranychidae.**

*Tetranychus telarius* Linnaeus, the red spider; Europe; very injurious to sugar-beet foliage.

HEMIPTERA.

**Aphididae.**

*Aphis rumicis* Linnaeus; Europe; sugar-beet foliage.

ORTHOPTERA.

**Grylotalpidae.**

*Grylotalpa grylotalpa* Linnaeus (*vulgaris* Latreille); Europe, introduced into New Jersey; injures roots.

**Gryllidae.**

*Grillus metas* Charp.; Europe; seriously injures the roots.

**Silphidae.**

*Blitophaga opaca* Linnaeus; Europe, North America; feeds as larva on foliage of beets, an unusual habit for this family. It is harmless in America at present.

*Blitophaga undata* Miller; *Silpha obscura* Linnaeus; and *Phosphuga atrata* Linnaeus; Europe; larvae feed on foliage of beets.

---

**Fig. 28.**—The Hawaiian beet webworm (*Hymenia fascialis*): Female moth. Enlarged. (Marsh.)

**Tenebrionidae.**

*Pedinus femoralis* Linnaeus, and *Gonocephalum (Opatus) sabulosum* Linnaeus; Hungary; larvae injurious to roots of sugar beet; adults injure the foliage.

**Coccinellidae.**

*Subcoccinella 24-punctata* Linnaeus; Europe; larvae and adults injure vegetation.

**Elateridae.**

*Lacon murinus* Linnaeus and *Corymbites aeneus* Linnaeus, wireworms; Europe; attack the roots of seedlings.

*Atheta niger* Linnaeus. (See Tobacco.)

*Agriotes lineatus* Linnaeus. (See Tobacco.)

**Meloidae.**

*Epicauta rufidorsum* Goeze, blister beetle; Europe; defoliates and sometimes destroys entire plants.

**Scarabaeidae.**

*Melolontha vulgaris* Linnaeus, June beetle, Europe; larvae feed at roots.

*Rhizotrogus œquinocialis* Herbst; Europe; the larvae feed at the crown and roots killing many plants.
Chrysomelidae.

Coccidae, Vill; Europe; larva and adult feed on foliage.

Chelgiodes clavata Fabric.; Chrysolina eugeniae Hübner, Phyllonorycter attenuata Koch, P. chrysoscelides Linnaeus, Phytophaga sittula Redtenbacher, P. nemorum Linnaeus, P. nigripes Fabricius, P. atra Fabricius, P. cruciferae Geoff., flea beetles; Europe; injure the foliage.

Brachyrididae (Otiornithidae).

Brachyris ranae Fabricius (Otiornithidae), B. ligniceti Linnaeus, B. orbicularis Herbst; Europe; adults injure the foliage and young plants.

Psyllidium mazzilusum Fabricius; Europe; adult injures plants.

Curculionidae.

Liparia coronatae Geoff.; Europe; breeds in the roots.

Bothynodes punctiventris German; and B. farinosus Fabricius; Europe; injure young plants and roots.


Lixus ascensi Linnaeus; Europe; breeds in the stems.

Coccus scorfulariae Linnaeus; Europe; adults feed on foliage of beets and mangolds.

LEPIDOPTERA.

Pyralidae.

*Phylactia ferrugalis Hübner; Europe, Asia, North America (see Cabbage).

Noctuidae.

Agrasta solenoptera Schiffermiller, A. plectra Linnaeus, A. celerationis Linnaeus, cutworms; Europe; injure young plants and roots.

Melanota brasica Linnaeus, M. distṁitis Kn., M. oleracea Linnaeus; Europe; feed on foliage.

Coleomia caeca Linnaeus; Europe; attacks beets.

*Plusia gamma Linnaeus; Europe, Asia, North America; in Europe injurious to beets.

HYMENOPTERA.

Tenthredinidae.

Athalia spinarum Fabricius, a saw fly; Europe; South Africa; attacks foliage of beets (see Turnip).

DIPTERA.

Tipulidae.

Pachybrina maculata Meigen, a crane fly; Europe; larva attacks the roots of beets.

Tipula oleracea Linnaeus and T. pulchraa Meigen; Europe; also occasionally attack beet roots.

LITERATURE.

JABLOWSKI, J. Die Tierischen Feinde der Zuckerroße (translation by J. Reitzel), Budapest, 1909.


BARGILI, P. Rassegna Biologica di Riesoleti Europei, 1580-1587.

BERSEEM; EGYPTIAN CLOVER.

(*Trifolium alexandrinum* Linnaeus. Family Leguminosae.)

This forage plant has been introduced in a small measure into the United States from Egypt. It has a number of important enemies in Egypt which attack other crops also grown in this country. (See Clover.)

BETEL NUT.

(*Areca catechu*, etc. Family, Palmacea.)

A tropical palm yielding the betel nut of commerce.

IMPORTANT ARECA INSECTS.

HEMIPTERA.

Cocicidae: (See Mango.)

Coccus acutissimus Green; Ceylon; Areca catechu. (See Mango.)

Coccus minimum Newstead; England; Me; le; Areca catechu.

Leucocytisps cockerelli de Charmoy; Brazil; Areca catechu.
BIRCH INSECTS.

(Betula spp. Family Betulaceae.)

Ornamental deciduous trees or shrubs grown chiefly for their bright green handsome foliage. There are many species occurring in North America, Europe, north and central Asia. Propagated from seed and readily transplanted. The bark and wood are of value in the arts and crafts, and some species yield a sap used as a beverage. The bark of *B. papyrifera* is used in making canoes and for tanning leather.

A. BETTER KNOWN BIRCH PESTS LIKELY TO BE IMPORTED.

*Eriophyes rudis* Can.

(Birch Blister Mite. Eriophyidae; Acarina.)

*Hosts*: *Betula alba, B. pubescens, B. odorata.*


*Description and biology*: A four-legged blister mite which forms gall-like swellings of the buds. Very easy to introduce on nursery stock.

*Distribution*: Europe, England (especially severe around London).

Sorauer, P. Handbuch der Pflanzenkrankheiten, 3d edit. vol. 3, 1913, p. 117, 118. fig. 93.

*Magdalis carbonaria* Linnaeus.

(Birch Twig Weevil. Curculionidae; Coleoptera.)

*Hosts*: *Corylus avellana L., Prunus domestica L., Betula alba L., Juglans regia L., Pinus.*

*Injury*: Breeds in young twigs.

*Description and biology*: Weevil similar to the common Magdalis species of this country. The eggs are laid in small dead or injured twigs. Larva feeds in medullary canal of twigs. Pupates in tunnel. Adults feed on foliage.

*Distribution*: Europe.


B. OTHER IMPORTANT BIRCH PESTS.

HEMIPTERA.

*Aphididae.*

*Glyphis betulae* Kaltenbach, a plant louse; Germany; attacks leaves and twigs.

*Coecididae.*

**Armed—**

*Chionaspis saticia* Linnaeus; Europe.

**Unarmed—**

*Lecanium ciliatum* Douglas; Europe.

*Lecanium coryli* Linnaeus; Europe.

*Lecanium puthrarum* Marchal; Europe; *Betula verrucosa.*

*Pulvinaria betulae* Linnaeus; Europe; *Betula alba.*

ORTHOPTERA.

*Gryllotalpidae.*

*Gryllotalpa gryllotalpa* Linnaeus; Europe, New Jersey; injures roots, young shoots, and germinating seed. (See text, fig. 27.)
Buprestidae.  
*Agriotes> viridis* Linnaeus; a wood borer; Europe; bores in bast and sapwood of seedlings and young stems and branches of older trees.

Lymexyloidae.  
*Hylobius buquet* Linnaeus; a wood borer; Germany, Sweden.

Passalidae.  
*Passalus coryli* Perch.; a large black beetle; India; breeds in rotting wood.

Scarabaeidae.  
*Ammolus* *xenae* De Geer; Europe, adults attack foliage.  
*Melolontha hippocastani* Fabricius; and *M. melolontha* Linnaeus; June beetles; breed at the roots of seedlings, and adults feed on foliage.  
*Polyphylla fullo* Linnaeus: Europe; also attacks roots and foliage in the same manner.

Chrysomelidae.  
*Agrotis alni* Linnaeus; a leaf beetle; Europe; larvae and adults feed on foliage.  
*Lochmna capreolae* Linnaeus; Europe; larvae and adults feed on foliage.  
*Melaena* *xenae* Linnaeus; Europe; larva and adults feed on foliage.  
*Helicta querctorum* Foudr.; Europe; defoliates. (See Oak.)

Cerambycidae.  
*Phagus* *mordax* De Geer; Sweden; bores in stems and branches.

Attelabidae.  
*Euphoria betula* Linnaeus.  
*Apoderus coryli* Linnaeus, and *Eupetis betulae* Linnaeus; leaf-rolling weevils; Europe; the larve breed in the rolls.

Brachyrrhinidide (Otiorrhynchidae).  
*Strophosoma capitata* De Geer, and *S. melanogramma* Forster; weevils; Europe; adults feed on foliage, and larvae at the roots.  
*Brachytrinus incanus* Linnaeus, a weevil; Europe; adults feed on foliage.  
*Metallites iris* Olliver; Europe; breeds at roots, adults attack buds and leaves.  
*Polydrusus cerinus* Linnaeus, *P. intermedius* Zetterstedt, *P. planonastes* Gyllenhal, and *P. undatus* Fabricius; Europe; feed as adults on foliage of *Betula alba*, and probably some of them breed on the plant.  
This is a dangerous genus.  
*Phyllobius argentatus* Linnaeus, *P. betulae* Fabricius, *P. maculicornis* German, *P. pyri* Linnaeus, and *P. sinuatus* Fabricius; Europe; feed as adults on foliage and probably some of them breed on the plant.

Curculionidae.  
*Anoplophora plantaris* Schönherr; Europe; adults feed on buds and young leaves.  
*Hyllobius abietis* Linnaeus; Europe; bores in the bark.  
*Cryptorhynchus lapathi* Linnaeus; Europe; breeds in young shoots, branches, bark, and wood. An important pest introduced into the United States.

Scolytidae, Ipidae.  
*Scolytus ratzeburgi* Janson and *S. rugulosus* Ratzeburg; Europe; make galleries in bark. (See text fig. 28.)  
*Anisandrus diripar* Fabricius; Germany; makes galleries in wood.  
*Xylopterus domesticus* Linnaeus, and *X. signatus* Fabricius; Germany; galleries in sapwood.

Cossidae.  
*Cossus cossus* Linnaeus; goat moth; Europe; bores in wood. (See Willow.)  
*Zeuzera pyrina* Linnaeus; Europe, Africa, North America; bores in wood. (See Horse chestnut.)

Geometride.  
*Anisopteryx xaceraria* Schiffermiller; a looper; Europe; feeds on foliage.  
*Cheimatobia boreata* Hübin; Europe; feeds on buds, leaves, and new growth.  
*Hibernia aurantia* Esp., *H. defoliaria* Linnaeus, and *H. marginaria* Borkh.; Germany; feed on buds and leaves.  
*Larentia dilutata* Borekh.; Europe; feeds on foliage of *Betula odorata*.  
*Larentia nebula* tabug.; Sweden; feeds on foliage.

Lasiocampidide.  
*Eriogaster lanestris* Linnaeus; Germany; feeds on foliage.  
*Malacosoma neustria* Linnaeus; Europe; defoliator. (See Forests.)
INSECTS OF BIRCH AND BLACKBERRY.

Lymantridae.
Dagshira pudibunda Linnaeus, Lymantria monacha Linnaeus, Porthesia similis Füssly, forest defoliators; Europe. (See Forests.)

Sesiidae.
Sesia speciformis Grng.; Europe; bores in trunk.
Sesia scoliaformis Borckh.; Sweden; bores in trunk.

Tortricidae.
*Peronea ferrugana* Treitschke; Europe, North America; attacks foliage.

Notodontidae.
*Phalera bucephala* Linnaeus; Europe. (See Forests.)

Hymenoptera.

Cimbicididae.
Cimbex variabilis Klgs., a saw fly; Europe; feeds on foliage.
Trichiosoma lucorum Linnaeus; Europe; defoliates.

Tenthredinidae.
*Nematus (Croesus) septentrionalis* Linnaeus; Europe; defoliates.
*Priophorus peti* Linnaeus; Europe (see Plum).

Xiphydriidae.
*Xiphydria prolongata* Linnaeus, wood wasp; Europe; bores in the wood.

BIBLIOGRAPHY.

SORAUER, P. Handbuch der Pflanzenkrankheiten, 3rd edit., 1913, vol. 3.
NÜSSLIN, O. Leitfaden der Forstinsektkunde, 2nd edit., 1913.
BARGAGLI, P. Rassegna Biologica Rhinocfori Europel, 1883-1887.
THÄGARDH, L. Sveriges Skogsiusekter, 1914.
LINDINGER, L. Die Schilddiuse (Coccide), 1912.

BLACKBERRY; RASPBERRY; LOGANBERRY.

(Rubus spp. Family Rosaceae.)

A large genus of shrubs bearing many different kinds of delicious small fruit, natives of America, Europe, and Asia.

IMPORTANT BLACKBERRY INSECTS.

Coleoptera.

Byturidae.
*Byturus tomentosus* Fabricius; Europe; larva feeds in fruit of raspberries and blackberries.

Brachyrhinidae.
*Brachyrhinius troboricus* Herbst; Europe; larvæ attack roots, adults attack foliage.

Curculionidae.
*Rhinaria perdis* Pascoe; Australia.
*Hypera variabilis* Herbst; Europe; raspberry. (See Clover.)
*Anthonomus rubi* Herbst; Europe: larva at roots, adult attacks foliage.

Lepidoptera.

Tortricidae.
*Nacotia roborana* Treitschke; Europe. (See Currant.)

Sesiidae.
*Bembecia hyaliformis* Lasp.; Europe; bores canes.

Lasiocampidae.
*Macrothylacia rubi* Linnaeus; Europe; defoliator.

HYMENOPTERA.

Tenthredinidae.
*Entodecta pumila* Klug, a sawfly; Europe; mines in leaves.

Cephilidae.
*Janus fumipennis* Ever.; Europe; mines in stems.
BOX.
(Buxus spp. Family Euphorbiaceae.)

Evergreen shrubs or small trees commonly used for hedges, occurring natively in Central and Eastern Asia, North Africa, Europe, and Central America, and much used in this country.

IMPORTANT INSECT ENEMIES OF BOX.

HEMIPTERA.

Coccidae:
Unarmored—
Eriococcus buxi Fonsecombe; Europe.

DIPTERA.

Hottonidae (Cecidomyiidae).
* Monarthropalus buxi Laboulbene; Europe, eastern United States; leaf miner.

BROOM CORN.
(See Sorghum.)

BRUSSELS SPROUTS.
(See Cabbage.)

BUCKTHORN.
(Rhamnus spp. Family Rhamnaceae.)

Ornamental deciduous or evergreen shrubs or trees propagated from seed or cuttings. The genus occurs chiefly in the northern temperate regions, but some species are found in Brazil and South Africa. The wood of *R. frangula* is made into charcoal valued for the manufacture of gunpowder.

IMPORTANT INSECTS ATTACKING BUCKTHORN.

HEMIPTERA.

Coccidae.
Leuctium ciliatum Douglas; Germany, Tyrol; attacks *Rhamnus alaternus*, and *R. frangula*.
Chionaspis salicis Linnaeus; Austria; attacks *R. frangula*.
A number of scales already in the United States also attack *Rhamnus*.

LEPIDOPTERA.

Cossidae.
*Zeuzera pyrina* Linnaeus; Europe, Africa, N. America, bores in wood. (See Horse-chestnut.)

Lymantridae.
Dasychira pudibunda Linnaeus, a defoliator; Europe. (See Forests.)
*Lymantria monacha* Linnaeus, the nun moth; Europe; defoliator. (See Forests.)

Hyponomeutidae.
Hyponomeuta padi Zeller, a web worm; Europe; attacks *R. frangula*.
Hyponomeuta evonymella, a web worm; Europe.

LITERATURE.

Hess, R. Der Forstschutz, 1900, vol. 2.
Lindinger, L. Die Schildläuse (Coccidae), 1912.

CABBAGE; KALE; COLLARD; BRUSSELS SPROUTS; CAULIFLOWER; KOHLRABI.

(Brassica oleracea Linnaeus, varieties. Family Cruciferae.)

The many varieties of this species especially in Europe, have very important pests, which it is not desirable to have imported into this country. Since the flower head is used in some varieties, the foliage in others, and the roots in others, there is danger of importing almost any pest of the species.
The red-banded thrips (*Heliothrips rubrocinetus*): Fig. 1.—Adult  Figs. 2-4.—Nymphal stages.  (Russell.)
A. BETTER KNOWN CABBAGE PESTS LIKELY TO BE IMPORTED.

Contarinia torquens Meijere.

(Cabbage Midge. Itonidæ [Cecidomyiæ]; Diptera.)

Hosts: Cabbage.
Injury: Attacks young cabbage plants, especially, breeding in the leaf axil and hindering growth. Has several generations. Pupates in soil.
Distribution: Europe.

Dasyneura brassicae Winner.

(Cabbage Gall Midge. Itonidæ [Cecidomyiæ]; Diptera.)

Hosts: Cabbage, rape.
Injury: Breeds in fruit.
Description and biology: Fly blackish brown, thorax covered with pubescence giving a silvery sheen, abdomen flesh red, with black bands; length 1.2–1.5 mm. long, milk white. Forms a gall in the fruit, feeds on the seed.
Distribution: Europe.

Phaonia trimaculata Bouche.

(Cabbage Maggot. Anthomyiæ; Diptera.)

Hosts: Cabbage.
Injury: Breeds in the roots.
Description and biology: Fly light gray, four black interrupted streaks and three brown spots on thorax; eyes hairy; length 8 mm. Maggot 11 mm. long.
Distribution: Europe.

B. IMPORTANT CABBAGE PESTS.

ORTHOPTERA.

Grylotalpidae.
*Scapteriscus didactylus* Latreille; Porto Rico, Georgia; quite injurious, cuts below surface of soil.

COLEOPTERA.

Elateridae.
*Agriotes lineatus* Linnaeus. (See Tobacco.)

Chrysomelidae.
*Psylliodes chrysocephala* Linnaeus and *P. napi* Fabricius. (See Rape.)

Brachyrhinidae.
*Barynotus aquamnus* Germar; Europe, Canada; adults strip plants to ground.

Curculionidae.
*Boris glabra* Herbst, *B. chlorizans* Germar, *B. opiparis* Duval; Europe; breed in root and stem.
*Boris coriaceus* Scopoli; Europe; breeds in stem.
*Boris lepidii* Germar, and *B. viridisericea* Goze; Europe; breeds in root and crown.
*Ceutorhynchus cyanipennis* Germar, and *C. sulcicollis* Paykull; Europe; breeds in crown.
*Ceutorhynchus quadridens* Panzer; Europe; breeds in roots.

LEPIDOPTERA.

Pieridae.
*Pieris napi* Linnaeus, Porto Rico, southern United States; cabbage worm.

Pyralidae.
*Evergestis extimalis* Sc. (See Rape.)

Plutellidae.
*Plutella maculipennis* Curtis; cosmopolitan; destructive to leaves.
50

Noctuidae.
Mamestra oleacea Linnaeus and M. brassicae Linnaeus; Europe; very destructive to cabbage. (See text fig. 29.)

DIPTERA.

Anthomyiidae.
* Chortophila fusiceps Zetterstedt. (See Corn.) Anthomyia radicicrum Meigen; Europe. (See Radish.)

CACAO; CHOCOLATE.
(Theobroma spp. Family Sterculiaceae.)

Cacao is a very important article of commerce entering the United States. It is not grown in the United States proper, but is to a small extent produced in Porto Rico, Hawaii, and the Philippines.

A. AN IMPORTANT CACAO PEST LIKELY TO BE IMPORTED.

Zaratha cramerella Sn
(Cacao moth. Gelechiidæ; Lepidoptera.)

Hosts: Cacao, Nephelium lappaceum.

Injury: Very destructive to the fruit.

Description and biology: Moth small. Larva 10-12 mm. long, whitish, with greenish shimmer. Pupa in oval flattened woolly cocoon on outside of fruit, leaves, and twigs.


B. OTHER IMPORTANT CACAO PESTS.

THYSANOPTERA.

* Heliotris rubrocinclus Giard; West Indies, Ceylon, Uganda, Florida (see pl. X)

HEMIPTERA.

Coccidæ.
Philephedra theobroma Green; Trinidad, Theobroma cacao,

Miridæ.
Helopeltis theivora and H. antonii; Ceylon and Java: Sahibergella singularis; Kamerun.

COLEOPTERA.

Scarabæidæ.
Adorettium umbrosus Fabricius, and var. tenuimaculatus Waterhouse; Hawaii, Japan, Philippine Islands, Java. (See Rose.)

Buprestidae.
Chrysochroa bicolor Fabricius, and C. fulminans Fabricius; Java; borers.

Cerambycidae.
Epeopeotes lucas Fabricius; Java; caoutchouc, cacao, mango.
Monohamnius fastulator German; Java, Sumatra, Borneo; coffee, cacao (bores in bark, wood, and fruit).
Monohamnius ruwpatzor Fabricius; Kamerun; cacao.
Tragopha senatoria Th.; Kamerun; cacao.
Moecha adusta Har.; West Africa, East Africa; cacao, Kickxia.
Fraenetha melanura Pascoe; Java; cacao, coffee.
Ekkoia quadricornis Olivier; Trinidad; cacao.
Steirastoma depressum Linnaeus; West Indies, South America; cacao, silk cotton tree (Ceiba), okra, etc.
Glenea novempustulata Castelnau, Java; cacao.

Chrysomelidae.
Crepidodera costatipennis Jacoby; Kamerun; defoliator.
**INSECTS OF CACAO, CANTELOUPE, CARROT, CASSAVA, CATALPA.**

**LEPIDOPTERA.**

*Pyralidae.*

*Dichocrocis punctiferalis* Guénée; Orient. (See Corn.)

**Notodontidae.**

*Stauropus alternus* Walker; India, Ceylon, Java; defoliator.

**Cossidae.**

*Zeuzera coffeae* Nieltner; Asia, Africa. (See Coffee)

**Trypetidae.**

*Ceratitis punctata* Wiedemann; Africa; fruit fly. (See Fruit)

*Notodontldse.*

*StauTopua aurernus* Walker; India, Ceylon, Java; defoliator.

**Cassava.**

*Catalpa.*

*Eugophoridae.*

*Depressaria nervosa* Hw.; Europe; very injurious to flower heads.

**DIPTERA.**

*Agromyzldse.*

*Phytomyza affinis* Fallen. (See Tobacco)

**CASSAVA; TAPIOCA; CEARA RUBBER.**

*(Manihot utilisima* Pohl., etc. Family Euphorbiaceae.)

Cassava (*M. utilisima*) is a tropical plant, grown to a limited extent in the southern United States. As it is propagated from cuttings, there is always danger of introducing serious pests when cuttings are imported. A recent shipment of cuttings from Brazil for propagation in this country was badly infested by a stalk-boring weevil *Leiomerus grankollis* Pierce (see Proc. U. S. Nat. Mus., vol. 51, No. 2159, pp. 469-471).

Ceara rubber (*M. glaziovii*) is also an important plant.

**CATALPA.**

*(Catalpa spp.* Family Bignoniaceae.)

Deciduous ornamental trees of North America, and East Asia; much cultivated in this country. The wood is valued for railway ties and fence posts.
IMPORTANT CATALPA INSECTS.

HEMIPTERA.

Armed—

*Diaspis pentagona* Targioni-Tozzetti; Europe, Asia, Australia, Pacific Islands, Africa, South America eastern United States; attacks fruits and many other plants.

LITERATURE.

LINDENGER, L. *Die Schädläuse (Coccidæ)*, 1912.

CAULIFLOWER.

CEDAR.

(*Cedrus* spp. Family Juniperaceæ.)

Large evergreen trees of North America, North Africa, Asia Minor, and the Himalayas, highly valued for their durable and fragrant wood.

INSECTS INJURIOUS TO CEDAR (*CEDRUS*).

COLEOPTERA.

*Buprestidæ.*

*Sphenoptera aterrima* Kerremans; India; bores in bast and sapwood of deodar (*Cedrus deodara*).

*Sphenoptera lafertei* Thomson; India; deodar.

*Tenebrionidæ.*

*Camarimena rugosistriatís* Blair; India; deodar

*Cerambycidæ.*

*Teleplus dorcioides* Pascoe; India; bores in trunk of deodar.

*Strongylyrus thoracicus* Pascoe; Australia; white cedar.

*Tetrópium oreinum* Gahan; India; deodar.

*Trinophyllum cribrámatum* Bates; India; deodar.

*Brachyrhinidæ.*

*Brachyzystus subsignátus* Faust; India; defoliates deodar.

*Cossonidæ.*

*Rhyncholus himalayensis* Stebbing; India; bores in wood of deodar.

*Scolytidæ.*

*Polygraphus major* Stebbing; India; bores in deodar.

*Polygraphus aterrimus* Strohmeyer; India; deodar.

*Cryphalus deodara* Stebbing; India; deodar stems.

*Cryphalus himalayensis* Stebbing; India; deodar stems.

*Ips stebbingsi* Strohmeyer; India; deodar stems.

*Pityogenes coníferæ* Stebbing; India; deodar.

*Scolytus major* Stebbing, *S. minor* Stebbing and *S. deodara* Stebbing; India; deodar.

*Platypodidæ.*

*Cossotarsus coníferæ* Stebbing; India; deodar.

LEPIDOPTERA.

*Pyralidæ.*

*Euzophera cedrella*; India; infests cones of deodar.

*Phycita abietella*; India; infests cones of deodar.

CELEY.

(*Apium graveolens.* Family Umbellifereæ.)

A garden vegetable much cultivated for its edible stems.

A. A CELERY PEST LIKELY TO BE IMPORTED.

*Acedia heraclei* Linnaeus.

(Celery Fly. *Trypetidæ*; Diptera.)


Injury: Mines leaves and stems, causing considerable injury.
Description and biology: Fly brownish yellow, scutellum dark, hind part of thorax and abdomen shining black; head and antennae reddish yellow; length 5-6.5 mm. Maggot whitish. Pupates either in the leaf or in the soil (winter).

Distribution: Europe.


B. OTHER IMPORTANT CELERY PESTS.

LEPIDOPTERA.

Pyralidæ.
*Pionea forfiealis* Linneæus and *P. ferralis* Hübner; Europe. (See Cabbage.)

Agromyzidæ.
*Phytomyza affinis* Fallen. (See Tobacco.)

CHERRY.

CHESTNUT.

Deciduous trees and shrubs of America, Europe, Asia, and North Africa, producing edible nuts. The coarse-grained wood is much used for furniture, railway ties, and fence posts, as it is very durable in the soil.

A. BETTER KNOWN CHESTNUT INSECTS LIKELY TO BE IMPORTED.

Curculio elephas Gyll. (Balaininus).

(Chestnut Weevil. Curculionidæ; Coleoptera.)

Host: Chestnut.

Injury: To chestnut fruit. Not easy to introduce.

Description and biology.—Adult length 6-7.5 mm. A long egg-shaped beetle, reddish yellow brown and covered with whitish scales. Pupates in ground. Larva feeds in fruit of chestnut. Eggs placed by female in nut.

Distribution: Europe.


Laspeyresia splendana Hübner. (Carpoecapsa.)

(Nut Fruit Tortrix. Tortricidæ; Lepidoptera.)

Hosts: Chestnut; walnut; acorns.

Injury: Attacks the nuts, often quite destructive.

Description and biology.—Adult wing expanse 12-18 mm.; forewings whitish gray; basal patch gray, streaks of gray along costa; a large blackish brown area inclosing a silver-edged ocellated patch, in which are three or four black, longitudinal lines. Occurs in June and July. Pupation similar to that of codling moth. Larva, pinkish white; leaves fruit late in fall. Eggs deposited on young fruit, hatching in 10 days. (See text fig. 30.)

Distribution: Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 309.

B. IMPORTANT CHESTNUT INSECTS.

HEMIPTERA.

Cocicidæ.
Unarmored.

Lecanium pulchrum King; Germany, France.

COLEOPTERA.

Anobidæ.
Xestobium rufellosum DeGeer; Europe; bores in wood.

Bostrychidæ.
Bostrychus capucinus Linneæus; Europe; bores in lumber and barrel staves.
54

A MANUAL OF DANGEROUS INSECTS.

Scarabaeidae.
Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; larvae injure roots of seedlings.

Cerambicidae.
Callidium zizaeum De Geer; Germany; bores in wood of felled trees and lumber.

Chrysomelidae.
Pseudocolaspis indica Baly; India; adults destructive to inflorescence of Castanea vesca.

Scolytidae, Iridae.
Anisandrus dispar Fabricius; Germany; galleries in wood.
Dryocotes villosus Fabricius; Germany; galleries in bark.
Scolytus malai Bechst.; Europe; galleries in cambium.

LEPIDOPTERA.

Tineidae.
Tischeria complanella Hübner; Europe; leaf miner on Castanea vesca.

Tortricidae.
Tortrix viridana Linnaeus; Europe; feeds on buds and leaves of Castanea vulgaris.
Laspeyresia grossana Haworth; Europe. (See Beech.)

LITERATURE.

Lindinger, L. Die Schilfblätter (Coccidae), 1912.
Hess, R. Der Forstschutz, 1898, 1900.

CHICORY; SUCCORY.

(Cichorium intybus Linnaeus. Family Compositae.)

The greater part of the chicory root used in this country is imported from Europe, although a small quantity is raised in the United States. Importations of roots might very easily introduce pests.

CHINABERRY; UMBRELLA TREE.

(Melia azedarach. Family Meliaceae)

The common chinaberry tree of the South originated in India. It has been introduced into the Imperial Valley, California.
INSECTS OF CHINABERRY, CHOCOLATE, CINCHONA, CITRUS.

COLEOPTERA.

Platystomidae (Anthribidae).

*Arceurus fasciculatus* DeGeer; a cosmopolitan insect, breeds commonly in the berries. This is a pest of many dried vegetable products and is very injurious in the Southern States.

CHOCOLATE.

CINCHONA; QUININE.

(Cinchona. Family Rubiaceae.)

South American trees whose bark yields the quinine of medicine.

A. AN IMPORTANT CINCHONA PEST.

Boarnia crepuscularia Hübner.

(See *Cinchona* Geométridae. Geométridae; Lepidoptera.)

*Hosts*: Cinchona ledgeriana; elm.

*Injury*: Very injurious to cinchona in Java; attacks elm in Russia.

*Description and biology*: The larva attacks not only the foliage, but the bark of twigs and young branches, absolutely defoliating a tree when serious.

*Distribution*: Java, Europe, Asia.


B. OTHER CINCHONA INSECTS.

LEPIDOPTERA.

Cosidae.

Zeuzera coffeae Nietner; Orient. (See *Coffee*.)

Psychidae.

Ciana variegata Snellenhöven, and C. crameri Westwood; Orient. (See *Tea*.)

Lasiocampidae.

Odonestis plagifera Walker; Java; defoliator.

Metanastria hyrtaca Cresson; Java, very important defoliator.

Lymantanidae.

Euruchos flexuosa Snellenhöven; Orient; defoliator.

CITRUS; ORANGE; LEMON; KUMQUAT; LIME; TANGERINE; GRAPEFRUIT.

(Citrus spp. Family Rutaceae.)

Aromatic, glandular shrubs and trees cultivated in semitropical and tropical countries for their delicious fruits.

A. CITRUS PESTS LIKELY TO BE IMPORTED.

* Eriophyes oleivorus Ashmead.

(Orange Rust Mite; Lemon Silver Mite. Eriophyidae; Acarina.)

*Hosts*: Orange, lemon.

*Injury*: Blisters the leaves and fruit.

*Description and biology*: Four-legged blister mite which attacks citrus trees and causes rusts on the fruit.

*Distribution*: North America, South America, Bermudas, Australia.


Bemisia giffardi Kotinsky (Aleyrodes).

(Giffard White Fly. Family Aleyrodidae; Hemiptera.)

Host: Citrus.
Injury: Frequently abundant on citrus leaves, exuding honeydew copiously, which forms a medium for the development of sooty fungus.

Description and biology: Adult female about 0.69 mm. long. Pupa case greenish with purplish red eyes, about 1.26 mm. long and 0.63 mm. wide. Eggs uniformly dark brown in color, with apparently no pedicel.

Distribution: Hawaii. (Supposedly an introduced species.)


Aleurocaanthus wogluml Ashby.

(Spiny citrus white fly. Family Aleyrodidae; Hemiptera.)

Injury: Infests the lower surface of the leaves.

Description and biology: Immature stages black, spiny. Pupa case about 1.4 by .89 mm., elliptical; dorsum attached; eggs very small yellowish, sometimes reticulated.

Distribution: India, Ceylon, Philippine Islands, Jamaica, Bahama and Cuba.

Aleurothrixus porteri Quaintance and Baker.

(Porter’s white fly. Family Aleyrodidae; Hemiptera.)

Hosts: Orange, Solanaceous plants, Schinus dependens, Schinus molle, Jaboticaba, Lippia citriodora, and Myrtus.
Injury: Infests the lower surface of foliage.

Description and biology: Pupa case .88 by .50 mm., elliptical; dorsum somewhat elevated, covered with cottony wax; the abdomen with a distinct keel; margin incised. Adults yellow with dark brown eyes. Length, .88 mm., forewing 1.04 mm. long, without markings, but often uniformly clouded with dusky.

Distribution: Chile and Brazil.

Apate monachus Fabricius.

(Bostrychidae; Coleoptera.)

Hosts: Orange, plum, almond, coffee, avocado.

Description and biology: Larva bores in bark and heartwood; sap and twigs in neighborhood of galleries blackened.

Distribution: East and West Africa, Antilles, Europe.


Leptostyius praemorsus.

(Bark-borer. Cerambycidae; Coleoptera.)

Host: Citrus trees.
Injury: Attacks the stems near the ground or at the point of pruning, resulting in the ultimate death of the tree. May be introduced in nursery stock.

Description and biology: Adult brownish with long slender antennae. Eggs are quite likely laid in dead or dying portions of tree after pruning.

Distribution: Lesser Antilles.

Prays citri Miller.

(Philippine Orange Moth. Hyponomeutidae; Lepidoptera.)

Host: Orange, lemon, lime, mandarin, and cabuyao.

Injury: Injures the blossoms of orange and lemon.

Biology: Eggs deposited in the calices or peduncle of the flower; larvae upon hatching bore through the inclosing parts, often destroying the calyx, pistil, and ovules; pupate within the flower and also in leaves or forks of twigs or branches. C. F. Baker states that in the Philippine Islands "the larva of this moth lives just beneath the rind next to, but not in, the pulp. They produce the gall-like tumors which remain open at the tips. The adult moths are of two sizes."

Distribution: Sicily, Italy,Corsica, Ceylon, Australia, Philippines.


Silvestri, F. Dispense di Entomologia Agraria, 1911, p. 287.


Fig. 31.—Lemon butterfly (Papilio demoleus). (Maxwell-Lefroy.)


Papilio demoleus Linnaeus.

(Lemon caterpillar. Papilionidae; Lepidoptera.)

Hosts: Orange, lime, lemon, and other citrus trees.

Injury: Defoliates citrus trees and is one of the commonest butterflies in India.

Biology: Eggs yellow and deposited on topmost shoots of the plant. On hatching the larvae are brown with white markings; when fully grown the color changes to a vivid green with lateral brown markings. Pupate on the plant. Adults large and conspicuous. (See text fig. 31.)

Distribution: India and South Africa.


Nephopteryx sagittiferella Moore.

(Perak Pomelo Moth. Phycitidae; Lepidoptera.)

Hosts: Pomelo, lime, lemon.

Injury: Reported to be very destructive to pomeloes in the residency gardens at Kwala Kangsa. May be introduced in the soil.
Biology: Eggs laid singly on underside of fruit; caterpillars, on hatching, penetrate fruit, increasing size and number of galleries as each successive stage is passed; pupate in ground and emerge as adults in about 12 days.

Distribution: India, Europe (?)


**Phyllocnistis citrella** Stalton.

(Citrus Leafminer. Tineidae; Lepidoptera.)

Hosts: Citrus.

Injury: Injurious to citrus nursery stock in India, attacking the buds and young foliage. May be introduced in nursery stock in Wardian cases.

Description and biology: Adult, head, face, palpi, and legs white, antennae whitish, anterior wings white with two slender gray streaks, posterior wings whitish with pale gray cilia. Larvae mine the leaves of young nursery stock, the cocoon is usually placed at the edge of the leaf, which is rolled up.

Distribution: India, Philippine Islands.


**Ceratitis catolrel** Guérin.

(Mauritius Fruit Fly. Trypetidae; Diptera.)

Host: Tangerine.

Injury: Attacks fruit.

Description: Adult female fly 6–7 mm. long; male 5–6 mm.

Distribution: Seychelles Islands, Mauritius; Isles of Bourbon.


**Dacus æqualis** Coquillett.

(Large Australian Fruit Fly. Trypetidae; Diptera.)

Host: Orange.

Injury: Larvae feed on oranges.

Description: Adult female length 8–9 mm. (excluding ovipositor). Front margin of wings with broad ferruginous stripe. Antennæ long, and body wasp-shaped.

Distribution: New South Wales.


**Dacus ornatissimus** Frogaatt.

(Mandarin Fruit Fly. Trypetidae; Diptera.)

Host: Mandarin.

Injury: Breeds in fruit.

Description: Adult female 6 mm. in length, general color chestnut brown to ochreous, dorsal surface of thorax black, abdomen ochreous with narrow dark indistinct transverse lines. (See plate xxviii, figs. a, c.)

Distribution: New Caledonia.


**IMPORTANT CITRUS INSECTS.**

**HEMIPTERA.**

**Coccidae:**

Armored—

*Aspidiotus* (*Aonidiella*) *subrubescens* Maskell; New South Wales. Scale of female reddish brown, flat, subcircular, exuvia central forming a slightly elevated boss.

*Aspidiotus* (*Chrysomphalus*) *albopticus* Cockerell; Mexico. Scale of female 2–2.25 mm. in diameter, dark brown and often covered with a white secretion, exuvia central and free of secretion.

*Aspidiotus* (*Chrysomphalus*) *koheeli* Townsend and Cockerell; Mexico. Scale of female 1.5–2 mm. In diameter, circular to suboval, light brown to grayish, exuvia to one side.

*Aspidiotus* (*Chrysomphalus*) *persoonatus* Comstock. Bermuda. (See Olive.)
ISOPTERA.

Armored—Continued.

Aspidiotus (Chrysomphalus) scutiformis Cockerell; Central America, Mexico. Scale of female large, flat, occasionally nearly white, exuvia orange colored and not nipplelike.

Aspidiotus (Diapsidiotus) orientalis Newstead; Cuba, Poneirus trifoliata (Citrus). Scale of female 1.5-2 mm. in diameter, subcircular, light yellowish brown, exuvia central.

*Aspidiotus (Pseudonidia) articulatus Morgan; Barbados (Windward Islands), British Guiana, Costa Rica, Porto Rico, Panama, Ecuador, Venezuela, Nicaragua, Isle of Pines, Trinidad, Cuba, St. Lucia, Mexico, St. Vincent, Dominica. (See Coffee.)

Aspidiotus (Pseudonidia) clavigera Cockerell; Hawaii. Scale of female 2.5 mm. in diameter, blackish and usually covered by epidermis of the twigs.

Aspidiotus (Pseudonidia) duplex Cockerell. Scale of female 2.66 mm. in diameter, subcircular, dark blackish brown, exuvia orange colored and to one side.

Aspidiotus (Pseudonidia) fimbriatus Maskell; New South Wales. Scale of female 1.5 mm., flat, thin and circular.

Aspidiotus (Pseudonidia) trilobiformis Green; East Africa, Japan, Brazil. Scale of female 3-4.5 mm. in diameter, semicircular, reddish brown. (See text fig. 32.)

Lepidosaphes pinnaformis Bouché; German East Africa, Canary Islands, Sicily. Scale of female 1.75-2 mm. long, yellowish brown to dusky brown, curved or myrtilliform.

Parlatoria callanthina Berlee and Leonard; Italy, Sicily. (See Olive.)

Parlatoria cinerea Deans and Hadden; Society Islands on orange. Scale of female circular, slightly convex, pale brownish gray.

Parlatoria sinensis Maskell; China on orange. Scale of female usually encrusting twigs.

*Parlatoria zyphus Lucas; Italy, Sicily, Philippines. Often received on imported lemons. Scale of female black.

Unarmored—

Ackeria punctata Cockerell; Grenada; Citrus medica acida. Female scale about 3.5 mm. long, hemispherical, pale ochreous.

Coccus eiridis Green; West Indies, Ceylon, Montserrat. (See Coffee.)

Coccus hesperidum Linnaeus; cosmopolitan; citrus, tea, palm. (See p. 11, fig. 4.)

Icerya montserratensis Riley and Howard; Ecuador, Montserrat, Porto Rico. Female reddish yellow, antennae and legs black, waxy secretion white, corrugated long wax tufts protrude from the body.

Icerya seychellarum Westwood; Seychelles Islands, Mauritius, Madeira, Japan, Madagascar. Female about 5 mm. in length, egg sac snow white, many long silvery hairs on dorsal aspect.

Orthezia prolonga Douglas; Jamaica, Trinidad, Brazil, British Guiana. Female long, narrow, pitchy black and covered with snow-white waxy laminations.

*Orthezia insignis Douglas; cosmopolitan; citrus, tea, etc. (See p. 14, fig. 2.)

Pseudococcus filamentosus Cockerell; Jamaica, Japan, Mauritius, Hawaii. Female about 3 mm. long, gray, covered with white secretions, antennae 7-jointed.

*Pseudococcus citri Risso; citrus, coffee, tobacco, cotton. (See p. 11, fig. 3.)

Pulvinaria aurantii Cockerell; Japan. Female usually on underside of leaf, with white ovisac about 5 mm. long, suboval.

Pulvinaria celullosa Green; Ceylon. Female including ovisac 4.5 to 5 mm. in length, ovisac snow white; female shrivels after gestation.

Takahashia citruscola Kuwana; Japan. Female free from the plant and resting upon the ovisac. Similar to T. japonica.

TERMITIDEA.

Termes australis Hagen; Australia. (See Apple.)

COLEOPTERA.

Scarabaeidae.

Aderus umbrosus Fabricius, and var. tenuimaculatus Waterhouse; Hawaii, Philippines, Japan, Java.

Bostrychidae.

Bostrychopsis jesus Fabricius; Australia; bores in trees.

Cerambycidae.

Uracanthus cryptophagus Olivier; Australia; bores in trunks.

Acrocinus accentifer Olivier; Brazil; bores in trunks of orange, tangerine, limes, lemons. (Boletin Agricultura, ser. 15, pp. 1066-1072.)

Diplochera rotundicollis Serville; Brazil; girdles and bores in twigs (Bo. Agric., ser. 15, pp. 1073-1081).
Curculionidæ.
*Orthorrhinus cylindriroatris* Fabricius; Australia; bores in wood (French, Handbook Destr. Ins. Victoria, pt. 4, p. 82).
*Cratosomus reidi* Kirby; Brazil; bores long tunnels in stems and trunks of orange. (Bol. Agric., ser. 15, pp. 1081-1092.)
*Diaprepes abbreviatus* Linnaeus; West Indies. (See Sugar cane.)

Lepidoptera.

*Pyralidæ.*
*Dichoerocis punctiferalis* Guénée; Queensland. (See Corn.)

*Papilionidæ.*
*Papilio idæus* Fabricius; Brazil; feeds on foliage.

Diptera.

*Trypetidæ.*
*Anastrepha fratercula* Wiedemann, attacks oranges. (See Fruit.)
*Anastrepha ludens* Loew; Mexico; attacks orange and sweet lime. (See Fruit.)
*Bactrocera tryoni* Froggatt; Orient. (See Fruit.)
*Ceratitis capitata* Wiedemann; attacks *Citrus aurantium*, *C. grandis* (decumana), *C. japonica*, *C. limonia* and *C. nobilis*. (See Fruit.)
*Dacus ferrugineus* Fabricius; India, etc. (See Fruit.)
*Dacus diversus* Coquillett; India. (See Fruit.)
*Dacus passiflorae* Froggatt; Fiji; attacks orange, lemon, and lime. (See Fruit.)

Fig. 33.—The clover-root curculio (*Sitona hispidula*); Adult, larva and pupa. Greatly enlarged (Wildermuth.)

Clover.

(Trifolium spp. Family Leguminosæ.)

There are many species of clovers used as forage crops in various parts of the world. Although clover is usually only imported as seed, several very serious foliage pests have been introduced from Europe.

The lasiocampid moth, *Lasiocampa trifolii* Ep., of Europe and Asia Minor, is injurious to clover. Many weevils of the genus *Sitona* not mentioned below are injurious to clover in Europe. They breed at the roots, but several have been imported into the United States. The weevils of the genus *Hypera* (Phytonomus) are equally dangerous to clovers. They breed externally on the foliage. Several European species have established strong colonies in this country. The weevils of the genus *Apion* (e. g. *A. apricans* Herbst) often breed in the heads of clovers and many of them are very dangerous. (For *Agriotes lineatus* Linnaeus see Tobacco.)

*Sitona* spp.

(Clover root weevils. Curculionidae; Coleoptera.)

*Species:* *S. lineata* Linnaeus; Europe (England); adults feed on peas, beans, etc., larvae feed at roots of these and clover and lucerne. *S. flavescens* Marsh.; Europe, introduced into America; clover, beans, peas, *Galega officinalis*. *S. hispidula* Fabricius; Europe, introduced into America, clover, peas, *Galega officinalis*. (See text fig. 33.) *S. linneellius* Gyllen-
INSECTS OF CLOVER, COCONUT, COFFEE.

hal; Europe; lucerne. *S. meliloti* Walton; Europe, *Melilotus officinalis* Derr. *S. sulcifrons* Thunberg; Europe; clover, *Atriplex hastata* L.

**Description:** Elongate grayish or brownish weevils with short blunt beak. The larvae breed at the roots of plants and in nodules. Important pests.

**Bargagli,** P. *Rassegna Biologica Rincofori Europei,* 1883–1887.

* **Mictotrogus pictrostris** Fabricius.

(Imported clover weevil. Curculionidae; Coleoptera.)

This is a recently imported weevil which attacks clover in New England. (See text fig. 34.)

**Hypera** (Phytonomus) spp.

(Clover-leaf weevils. Curculionidae; Coleoptera.)

**Species:** *H. punctata* Fabricius; Europe, introduced into America: clover and alfalfa. *H. meles* Fabricius; Europe, introduced into America: clover, alfalfa, grasses. *H. nigrostris* Fabricius; Europe; introduced into United States; clover, alfalfa, *Ononis* etc. *H. miles* Paykull, Europe; clover. *H. murina* Linnaeus; Europe; alfalfa, clover. *H. variabilis* Herbst; Europe; clover, beans, cabbage, raspberry, potato. *H. ononidis* Chevrolat; Europe; clover, *Ononis viscosa*.

**Injury:** These are all serious or potential pests and easily distributed. (See Alfalfa.)

**Description and biology:** The clover-leaf beetle, *H. punctata*, is very familiar to most entomologists in this country. The other species are of similar form but different colors of brown, gray, or green. The larvae feed externally on the leaves and pupate in silken cocoons.

**Bargagli,** P. *Rassegna Biologica Rincofori Europei,* 1883–1887.

**COCONUT PALM.**

(*Cocos nucifera.* Family Palmaceae.)

A large palm cultivated for ornament and for its edible fruit. It is grown in Florida and California as an ornamental tree. (See Palms.)

**COFFEE.**

(*Coffea arabica* Linnaeus; *Coffea liberica* Hiern. Family Rubiaceae.)

Coffee is grown in Africa, Asia, Central America, South America, and many of the islands of the Pacific and Atlantic. Although not grown in the United States proper, it is an important product of Porto Rico, Hawaii, and the Philippines. The importations of the beans into this country are enormous. Where beans or seedlings are imported into the Territories above mentioned, there is danger of introducing noxious insects.
A. BETTER KNOWN COFFEE INSECTS.

Tetranychus bioculatus Wood-Mason.

(Coffee Red Spider. Tetranychidae; Acarina.)

Host: Coffee, tea, tomato, Firmiana colorata, Anthocephalus cadamba.

Injury: Injures plant by sucking juices. May be easily imported on nursery stock and might attack other crops if introduced.

Description and biology: A tiny red spider very like the common red spider of this country and likely to be as dangerous.


Xyleborus coffeae Wurth.

(Coffee Beetle. Scolytidae; Coleoptera.)

Hosts: Coffea arabica, C. robusta, and C. liberica, Erythrina lithosperma, Melia azedarach, Cacao, Cinchona ledgeriana. Occasionally feeds on Hevea brasiliensis, although the sticky excretion of the plant catches and holds the beetles, resulting in their death.

Injury: Considered injurious to Coffea robusta, and it is recommended that this plant be discontinued in order to drive the insects to bruised or injured Hevea brasiliensis.

Description and biology: Adult male beetle 1.1 mm. long and 0.55 mm. broad; adult female 1.6 mm. long and 0.8 mm. broad; color shining brown. Bores in galleries in the wood.

Distribution: Dutch East Africa, Java, Tonkin.


Zeuzera coffeae Nietner.

(Red Coffee Borer. Cossidae; Lepidoptera.)

Hosts: Coffee, tea, cacao, cinchona, Acalypha marginata, Anona muricata, Duranta, Grevillea, Persea gratissima, Photinia, Santalum album, Swietenia mahagoni, cotton.

Injury: Bores in the wood or stalks.

Description and biology: Moth wing expanse 40-46 mm., head and thorax gray, with black spots; wings white with blue black spots, abdomen black with white hair. Bores in the wood. Pupates in larval bore near exterior. The pupa emerges partially before escape of moth.

Distribution: India, Ceylon, Java, Kamerun (German East Africa).


Leucoptera coeae Stalnton.

(Coffee Leaf Miner. Lyoniitidae; Lepidoptera.)

Host: Coffee.

Injury: Is said to have caused a loss of about 20 per cent of the crop in Brazil, 20 to 30 per cent of the leaves infested in Porto Rico, and a serious enemy in Cuba. Considered the worst of all coffee pests. Likely to be introduced on plants.

Description and biology: Adult moth 2.5 mm. long, silver gray color, tipped with black on posterior end. Eggs deposited in small slits made in the leaves; the larvae hatch within 4 to 6 days, live within the leaf about 3 weeks, and then leave the interior of the leaf through the upper epidermis and form a web, pupating on under surface of the leaf. The adult hatches in from 3 to 7 days.

Distribution: Porto Rico, Brazil, Cuba.

B. OTHER IMPORTANT COFFEE INSECTS.

HEMIPTERA.

Coccidæ:

Armored—

*Aspidiotus (Pseudonotia) articulatus* Morgan; Venezuela, Jamaica, British Guiana. Adult female 2-2.35 mm. in diameter, semitransparent, pale brown or yellowish.

*Lepidosaphes corrugata* Green; Java. Adult female, scale 3-4.5 mm. in length, 1 mm. broad, dull black, thick, opaque, with many curved transverse corrugations.

Unarmored—

*Asterolecanium coffee* Newstead; German East Africa. Liable to be introduced on leaves and twigs. Adult female, test golden yellow, margin fringed with golden yellow glossy filaments; test of old specimen opaque grayish with bottle-green markings.

*Cerococcus* Green; Ceylon. Liable to be introduced on twigs. Adult female enclosed in test of wax which is purplish brown, on each of the sloping sides are two wax ridges; length 2-2.5 mm.

*Crypococcus* Anderson; German East Africa. On *Coffea arabica.* (See Citrus.)

*Crypococcus violaceus* Newstead; Uganda. Liable to be introduced on leaves and twigs. Adult female, covered with wax, test dark cinnamon to brownish, young female star shaped.

*Coccus viridis* Green; Brazil, Ceylon, India, Mauritius. Liable to be introduced on cuttings and foliage. Adult female 2.5 to 3.25 mm. in length, breadth 1.5 to 2 mm.; pale green with loop of blackish spots on dorsum.

*Leccanium caudatus* Green; Ceylon. Liable to be introduced on cuttings and foliage. Adult female 3-4 mm. in length, 2-3 mm. in breadth; oval, narrow, in front broadly rounded behind, bright, castaneous.

*Orthococa sordida* Gard; Guadaloupe. Liable to be introduced on roots. Adult female 2 mm. long, 1.5 mm. broad, tawny red provided with laminations.

*Pseudococcus coffeae* Newstead; Java; Liberian coffee. Adult female covered with densely felted plates of white secretion.

*Pseudococcus virgatus* Cockerell; Jamaica, Mexico, Hawaii. Liable to be introduced on foliage, branches, or roots. Adult female 4-5 mm. long, white mealy brown above with caudal filaments about half the length of the body; antennae 5-jointed.

*Pulvinaria cameliola* Signoret; Hawaii. Adult female 2-3 mm. in length, oviscac from four to eight times length of insect.

*Pulvinaria fuscus* Hempel; Montserrat, Antigua, St. Kitts. Adult female length 5 mm., width 2.25 mm.; oviscac white and fluffy; antennae 8-jointed.

*Pulvinaria maculata* Maskell. Adult female before gestation about 8 mm. long. Ovisac large, snow white, forming a mass of loose cotton.

*Rhizococcus clavatus* Gard; Guadaloupe. Liable to be introduced on roots. Adult female elongate, anal tubercles prominent; antennae 5-jointed.

*Saisssetia nigra* Nieter; Costa Rica, Ceylon, India. Liable to be introduced on cuttings and plants. Adult female length 3-5 mm., breadth 2-3 mm.; black, oval, convex with dorsum occasionally forming a pronounced hump; a longitudinal carina is often present.

THYSANOPTERA.

*Heliobrthes rubrocinclus* Gard; West Indies, Ceylon, Uganda, Florida; attacks *Coffea libera.* (See plate X.)

COLEOPTERA.

Bostrichidae.

*Apatel monachus* Fabricius; Africa, West Indies. (See Citrus.)

Cerambycidae.

*Monohamus fusculator* German; Java, Sumatra, Borneo; bores in wood.

*Bizus spissicola* White; Sierra Leone to Kamerun; very serious borer.


*Antheras asperula* White; East and South Africa; a very serious borer.

*Frem mormora* Gerstäcker; East Africa.

*Pronotha melanura* Pascoe; Java.

*Niotis usambica* Kolbe; East Africa; a very injurious borer.

*Xylothus janaeus* Lap. et Gory; Java; bores in bark and wood.

*Xylothrichus quadripes* Chevrolat; India, Ceylon, Burma, Siam, Tonkin, Philippines; bores in bark and wood. (See text fig. 33.)

Brachyridiæ (Ottiophyridiæ).

*Hyponecora curta* Schönherr; eats the foliage of young plants in Java.

*Pachneus rotundus* German; breeds at the roots, the larvae gnawing the bark, in Cuba.

*Pachneus azureus* Gyllenhall; breeds at the roots, the larvae gnawing the bark in Cuba.
Brachyrhinidae (Otiorthynidida)—Continued.

Diaprepes abbreviatus Linnaeus; attacks the foliage and possibly the larvae attack the roots in the West Indies. (See Sugar cane.)

Oratopus punctum Fabricius; feeds on the foliage in Mauritius and Reunion.

Geonomus quadrinodosus Chevrolat; feeds as larva on the leaves in Venezuela.

Rhadinoscopus nocturnus Kolbe; feeds on the leaves in German East Africa.

Scolytidae.

Xyleborus inornatus Hagedorn; German East Africa; bores in Bukoba coffee and Coffea stenophylla.

LEPIDOPTERA.

Pyralidae.

Thelidoptera octoguttata Fld.; German East Africa; attacks beans.

Coculidae.

Parasa lepida Cr.; Java; serious.

Psychidae.

Clania crameri Westwood and C. variegata Snellenhoeven; Orient. (See Tea.)

Lymantriidae.

Dasychira mendosa Hübner, D. misana Moore, D. thwaitesi Moore and Orygia pastica Walker; India, Ceylon, Java; defoliators.

Notodontidae.

Staurupus alternus Walker; India, Ceylon, Java; defoliates.

DIPTERA.

Trypetidae.

Anastrepha fraterculus Wiedemann. (See Fruit.)

Ceratitis capitata Wiedemann; attacks Coffea arabica. (See Fruit.)

COLLARD.

See Cabbage.

CONIFERS.

(Family Pinaceae.)

Under this heading are treated the insect pests of Douglas spruce (Pseudotsuga), fir (Abies), hemlock spruce (Tsuga), larch (Larix), pine (Pinus), and spruce (Picea).

This grouping is due to the fact that these trees have so many pests in common and also because of a confusion in foreign and home literature of the names pine, spruce, and fir.

A. IMPORTANT INSECTS ATTACKING VARIOUS CONIFERS.

Diadoxus scalaris Laporte et Gory; Diadoxus erythrurus White

(Cypress Borers. Buprestidæ; Coleoptera.)

Hosts: Murray pine (Pinus frenela), Lambert's cypress (Cupressus lambertiana).

Injury: Very destructive to the wood, boring under the bark and into the wood.

Description: D. scalaris is the larger species. Both are greenish in color, with the elytra largely reddish brown except for green basal stripes and yellow discal spots. The median line of the thorax is yellow between two black or brown fasciae. Larvae yellowish white.

Description: Victoria, Australia.

Tetropium castaneum Linnaeus.

(Spruce Borer. Cerambycidae; Coleoptera.)

Hosts: Larch, spruce, pine, fir.

Injury: Bores in the wood.

Distribution: Europe, Siberia.


Brachyrhinus (Otiorhynchus spp.).

(Coniferous Root Weevils. Brachyrhinidae (Otiorhynchidae); Coleoptera.)

Species: B. niger Fabricius; Europe; pine, larch, spruce, maple, alder, ash, service berry; breeds at the roots and the adults attack the foliage. B. fuscipes Olivier; Europe; spruce. B. perdix Olivier; Europe; spruce. \*B. ovatus Linnaeus; Europe, United States; spruce. A very important pest of strawberries, conifers, and greenhouse plants. B. singularis Linnaeus; Europe; spruce, fir, and many other plants (see Grape). B. sensitivus Scopoli; Europe; spruce, Weymouth pine, Douglas fir. B. irritans Herbst; Europe; pine, beech. B. armadillo Rossi, B. aurifer Boheman, B. egregius Miller, B. fullo Schrank, B. inflatus Gyllenhal, B. jovis Miller, B. lepidopterus Fabricius, B. kratterii Boheman, B. morio Fabricius, B. multipunctatus Fabricius, and B. septentrionis Herbst, are reported on conifers in Europe.

Description: Black, oval weevils, with broad blunt beaks. Breed at the roots of plants and are very destructive.


Bargagli, P. Rassegna Biologica Rincofori Europei, 1883-1887.

Magdalis spp.

(Coniferous Weevils. Curculionidae; Coleoptera.)

Species: The weevils of this familiar genus are very destructive to forest trees, breeding under the bark but entering the wood. They are very easily distributed in logs. M. violacea Linnaeus; Europe; attacks 3 to 10 year old pines, larch, and fir. M. phlegmatica Herbst; Europe; spruce and pines. M. duplicata Germar; Europe; spruce, Pinus silvestris. M. memnonia Gyllenhal; Europe; pine. M. rufa Germar; Europe; pines and other conifers.

Bargagli, P. Rassegna Biologica Rincofori Europei, 1883-1887.

Dendroctonus means Kugelann.

(The Large Bast Beetle. Tipidae; Coleoptera.)

Hosts: Principally spruce (Picea). Occasionally pine.

Injury: Quite destructive to trees from breast height down to and including roots.

Description: Beetle elongate, nearly dull black, with long gray-yellowish hair not densely set. Wing covers punctate striate, antennae and legs yellowish red; 8-9 mm. long.

Evidence of infestation: Free resin flow out of holes about 3 mm. in diameter. Mixed with boring dust, it hardens in the air in white lumps.

Distribution: Germany, France.

Nüsslín, O. Leitfaden der Forstinsektenkunde. 1913, pp. 246-249, fig. 211.


27812—18—5
Ips typographus Linnaeus.

(Eight-toothed large spruce bark beetle or "typographer." Ipidæ; Coleoptera.)

_Hosts:_ Spruce; rarely larch and Scotch fir (Pinus silvestris.)

_Injury:_ Bores in bark and sapwood; while usually secondary, it also attacks healthy trees when very numerous. Recognized as the most dangerous bark-beetle in Europe.

_Description:_ Beetle black or brown, cylindrical, 4.5–5.5 mm. long, 8 teeth on margins of elytral declivity, of which the 3d on each side is the largest and with rounded apex.

_Evidence of infestation:_ Shows only when the tree begins to react by changing color of foliage.

_Distribution:_ Lapland to Alps, wherever spruce grows.

Nüsslin, O. _Leitfaden der Forstinsektenkunde._ 1913, pp. 269–272, fig. 238.


*Tomiclus* (Myelophillus) piniperda Linnaeus.

(The large or black pine pith borer or "forest gardener." Scolytidae; Coleoptera.)

_Hosts:_ Pine.

_Injury:_ Tunnels under bark of trunk and branches. Young adults feed on pith of 1 to 2-year old shoots. Attack sickly and quite healthy trees and invariably cause their death from above downward. Attacks thin, smooth bark of trunk and branches and heavy barked portion of lower trunk of living felled or sickly trees.

_Description:_ Beetle elongate, 3.5–4.5 mm. long; proboscis finely and not densely punctate; elytra finely punctate-striate, posteriorly with a row of brush-bearing small tubercles.

_Evidence of infestation:_ Fading and dying tops; long vertical galleries in bark. Twigs hollow at tip with pitch tubes at base.

_Distribution:_ Europe.


_Bupalus pinarius_ Linnaeus.

_Hosts:_ Pine, spruce, fir.

_Injury:_ Feeds on foliage and young shoots.

_Description and biology:_ Male moth bright yellow, female bright reddish brown, both marked with dark brown. Larva green, with three white dorsal lines and two yellow lateral lines.

_Distribution:_ Europe.


_Dasychira selenitica_ Esp.

(Larch Tussock Moth. Lymantriidae; Lepidoptera.)

_Hosts:_ Larch, pine, sainfoin, herbs, hardwoods.

_Injury:_ Defoliator, especially injurious to young trees.

_Description and biology:_ Moth brown; male olive brown; female brownish black, with white crescent and wavy line on wings. Larva black, with dark-gray hairs on black
warts, and the fourth to eighth segments each with a yellowish gray brush of hairs tipped with black; first segment with black hair pencil, eleventh segment with two. Pupates on surface of ground in a cocoon.

Distribution: Germany.


Laspeyresia duplicana Zetterstedt.

(Fir Bark Tortricid. Tortricidae; Lepidoptera.)

Hosts: White fir (Abies pectinata), juniper (Juniperus), spruce (Picea excelsa).

Injury: Breeds in the bark and possibly sometimes the twigs.

Description and biology: Moth 15–16 mm. in wing expanse; forewings dark brown, with a white crescentiform spot at middle and finer markings beyond. The larva breeds from fall to spring under bark. Its life history is not definitely worked out.

Distribution: Europe (Germany).


*Enarmonia pincolana* Zell.

(Gray Larch Moth. Tortricidae; Lepidoptera.)

Hosts: Larix, Abies, Siberian stone pine (Pinus cembra L.).

Injury: Attacks the needles.

Description and biology: Moth, wing expanse 18–22 mm., forewings shining light gray with brown markings. Larva dark green with darker stripes, head and thoracic shield black. Feeds under webs on the needles.

Distribution: Europe, Siberia, North America, but serious only in Europe.


**B. OTHER GENERAL CONIFEROUS PESTS.**

**HEMIPTERA.**

*Mindarus abletinus* Koch, a plant louse; Europe; attacks young shoots of *Abies pectinata* and bark of *Picea*.

**PHYLLOSERIIDEA.**

*Pinus sibiricas* Cholodkovsky; a gall louse; Russia; attacks *Pinus cembra* and *Picea* in alternating generations.

*Pinus orientalis* Dreyfus and *P. pini* Koch; Europe; attack *Picea orientalis*, *P. excelsa*, *Pinus montana*, *P. silvestris*, and *P. strobus*, its generations alternating on pine and fir.

*Pinus strobi* Hartig, gall louse; Europe; attacks *Pinus strobus*.

*Aphrasiasia pectinata* Cholodkovsky; gall louse; northeast Europe; attacks *Abies* and *Picea*.

*Dreyfusia nusslini* C. B.; gall louse; Europe; attacks *Abies nordmanniana* and *Picea*.

*Dreyfusia picea* Ratzburg; gall louse; Europe; attacks stems of *Abies pectinata*.

*Chermes viridis* Ratzburg; a gall louse; Europe; attacks *Larix* and *Picea*.

*Chermes abietis* Kaltenbach; a gall louse; Europe; attacks *Larix*, *Abies pectinata*, *Pinus cembra*, *P. silvestris*.

*Conaphalodes strobilobius* Kaltenbach; gall louse; Europe; attacks *Larix* and *Abies*.

*Conaphalodes lepophorus* Cholodkovsky; Europe; attacks *Picea* and *Larix*.

**COLEOPTERA.**

*Serropalpus barbatus* Schall.; Europe; bores in the bark and wood of *Abies pectinata* and *Picea*.

**BOSTRYCHIDAE.**

*Apatel molle* Linnaeus; Europe; bores in bark-stripped wood of conifers.
Buprestidae.

*Anthaxia quadripunctata* Linnaeus; Germany; bores in stems of young trees and branches of older trees of spruce (*Picea*).

Elateridae.

*Agriotes aterrimus* Linnaeus, *A. lineatus* Linnaeus, and *A. obscurus* Linnaeus; Europe; attack the seedlings and roots of pine, fir, and spruce, while some species attack larch.

*Dolopius marginatus* Linnaeus; Europe; attacks the roots of seedling and yearling fir, pine, and spruce.

*Selatosomus seneus* Linnaeus; Europe; attacks roots of pine, fir, and spruce.

Tenebrionidae.

*Setenes semiopaca* Blair; India; breeds in the trunks of *Picea morinda* and *Pinus excelsa*.

Cerambycidae.

*Hylotrupes bajulus* Linnaeus; Europe; bores in the finished lumber, especially building timbers and furniture of conifer.

*Monochamus sartor* Fabricius and *M. lecontei* Linnaeus; Europe; attack bark and wood of fir and spruce.

*Peponocephalus fasciatus* De Geer; Europe (Germany); bores in the wood of spruce, pine, and fir.

*Tetropium castaneum* Linnaeus; Europe; bores in the wood of larch, spruce, pine, and fir.

Brachyrhinidae (Otiornychidae).

*Metallites atomarius* Olivier, *M. laricis* Chevrolat, *M. mollis* Germar; weevils; Europe; as adults injure the buds of conifers; the larvae breed at the roots of trees.

*Brachypinus subignatus* Faust; a weevil; India; adult causes very serious defoliation of *Abies webbiana* and *Picea morinda*.

Curculionidae.

*Hylobius abietis* Linnaeus, *H. fatus* Rossi, and *H. piceus* De Geer; Europe; breed in the bark and wood of conifers. These are very important weevils.

*Pissodes harcynix* Herbst, *P. notatus* Fabricius, *P. picea* Illiger, *P. pini* Linnaeus, and *P. piniphilus* Herbst; weevils; Europe; breed under bark of pines, spruce, and fir. (See text fig. 36.)

Cossonidae.


*Rhyncolus himalayensis* Stebbing; India; bores in the wood of *Pinus excelsa* and *Picea morinda*.
Ipidae.

*Cryphalus abietis* Ratzeburg; Europe; attacks fir (*Abies pectinata*), spruce (*Picea excelsa*), and pine.

*Cryphalus saltarius* Weiss; Europe; attacks young fir, spruce, and pine.

*Cryphalus boswelliae* Stebbing; India; attacks spruce and *Pinus longifolia*.

*Cryphalus piceae* Ratzeburg; Europe; attacks *Abies pectinata* and larch.

*Crypturgus pusillus* Gyllenhal; Germany; attacks spruce, fir, pine (*Pinus strobus* and *P. pinaster*), and larch. In the Himalayas this species attacks *Pinus excelsa* and *Picea morinda*.

*Dryococcus autographus* Ratzeburg; Germany; attacks spruce, fir, and pine (*Pinus strobus*).

*Hylastes attenuatus* Erichson; Germany; attacks pine and spruce.

*Hylastes decumanus* Erichson; Europe; attacks spruce and *Pinus cembra*.

*Hylastes himalayensis* Stebbing; India; attacks *Picea excelsa*.

*Hylurgops palliatus* Gyllenhal; Europe; attacks *Pinus sylvestris*, *P. strobus*, *P. pinea*, *P. austriaca*, *P. maritima*, larch, and spruce.

*Ips amilinus* Eichhofer; Europe; attacks spruce, pine, fir, and larch.

*Ips cembrae* Heer; Europe; attacks larch and *Pinus cembra*.

*Ips duplicatus* Sahlberg; Finland and Ural; spruce and pine.

*Ips sedentatus* Boerner; Europe; spruce and pine (*Pinus austriaca* and *P. pinaster*).

*Ips ribentropi* Stebbing; India; *Pinus excelsa* and *Picea morinda*.

*†Ips typographus* Linnaeus; Europe; attacks spruce, larch, Scotch fir (*Pinus sylvestris*).

*Tomicus* (*Myelophilus*) minor Hartig; Europe; attacks pine and spruce.

**Fig. 37.—Bark beetle (*Pityogenes chalcographus*). (Eckstein.)**
Ipidæ—Continued.  
*Polygraphus subopacus* Thomson; Europe; spruce, pine.  
*Xylechinus pilosus* Knoch; Europe; pine, spruce, larch  
*Xyleturus lineatus* Olivier; Europe; fir, spruce, pine, larch.  

**LEPIDOPTERA.**

**Lymantriidae.**  
*Lymantria monacha* Linneæus; Europe; defoliator on pine, spruce, larch. (See Forests.)  
*Orgyia antiqua* Linneæus; Europe; spruce; pine; defoliator.  

**Noctuidae.**  
*Agrotis segetum* Schiffermüller; Europe; injures roots of seedlings and nursery stock of spruce, larch, pine.  
*Agrotis vestigialis* Rott.; Europe; injures roots of seedlings and nursery stock of pine and larch.  

**Pyralidae.**  
*Euophila cedrela* and *Phycita abietella* India; infest cones of blue pine (*Pinus excelsa*), fir (*Picea morinda*), and silver fir (*Abies webbiana*).  

**Tortricidae.**  
*Athena pygmyzana* Hübnér; Europe; spruce, fir; attacks needles on young shoots.  
*Tortrix piceana* Linneæus; Europe; attacks foliage of pine and other conifers.  
*Enorhina pinicola* Zell; Europe; attacks foliage of larch, pine, and spruce.  
*Tortrix viburniana* Fabricius; Norway; attacks *Picea excelsa,* *Pinus silvestris,* *P. montana,* *Larix decidua.*  

**Hyponomeutidae.**  
*Argyresthia funedella* F. R.; Europe; attacks needles of fir, spruce, and pine.  

**Calliminiidae.**  
*Megastigmus strobilobi*us Ratzeburg; a chalced; Europe; breeds in seed of hemlock and fir (*Abies pectinata*).  

**Diprionidae.**  
*Diprion pini* Linneæus; *D. rufus* Klug, and *D. pallidus* Klug; Europe; attack bark and needles.  

**Megalodontidae.**  
*Acantholyda cryphrocephala* Linneæus; sawfly; Germany; attacks foliage of pine, larch, spruce, fir.  
*Cephalcia hypodrophica* Hartig, and *C. signata* Fabricius; Europe; attack foliage of pine, spruce, fir.  
*Itycosia stellata* Christ.; sawfly; Europe; pine and fir.  

**Siricidae.**  
*Sirex juvencus* Linneæus, *S. spectrum* Linneæus, and *S. gigas* Linneæus; wood wasps; Europe; bore in wood of spruce, fir, pine, and larch.  
*Xeria spectrum* Linneæus; wood wasp; Europe; bores in spruce and fir wood.  

**DIPTERA.**

**Tipulidae.**  
*Pachyrhina crocata* Linneæus; crane fly; Germany; breeds in bark of young seedling balsam fir (*Abies balsamea*) and larch.  

**C. BETTER KNOWN IMPORTANT PESTS OF PINE (PINUS).**

**Eriophyes pini** Nalepa.  
(Pine Gall Mite. Eriophyidae; Acarina.)  

**Hosts:** *Pinus silvestris,* *P. montana,* *P. mugus.*  
**Injury:** Causes galls in the twigs resulting in deformed growth.  
**Description and biology:** A tiny elongate four-legged mite which breeds in the young twigs of pines.  
**Distribution:** Europe.  


**Gelechla dodecella** Linneæus.  
(Pine Bud Moth. Gelechiidae; Lepidoptera.)  

**Hosts:** Pines (*Pinus* spp.).  
**Injury:** Breeds in buds, needles, and young shoots, and is as injurious as *Evetria buoliana,* the pine-shoot moth.
Description and biology: Adult moth with wing spread 10–12 mm., forewings dark gray or gray brown, with two obscure light gray transverse fasciae, and six pairs of black flecks. Larva reddish brown with black head and thoracic shield. The larva bores in buds, needles, and young shoots.

Distribution: Germany.


*Cnethocampa pinivora* Treitschke; *Cnethocampa pityocampa* Schiffermuller.

(Pine Procession Moths. Cnethocampidae; Lepidoptera.)

*Hosts*: Pines.

*Injury*: Defoliator; sometimes serious.

Description and biology: *Moth* of *pinivora* with forewings yellowish gray, hind wings with a sharply toothed crossline. *Moth* of *pityocampa* with forewings whitish gray; hind wings with a scarcely toothed crossline. *Larva* of *pinivora* greenish gray, with velvety black dorsal stripe and black head, and with reddish yellow warts on the fourth to eleventh segments. *Larva* of *pityocampa* similar but slate blue to black. The larvae feed on the foliage and live gregariously, wandering in the daytime in processes of a single or double row. Pupate in cocoons in the ground. The larvae of *pityocampa* hibernate in nests in the crowns.

Distribution: Europe.


*Dendrolimus pini* Linnaeus.

(Pine Spinner. Lasiocampidae; Lepidoptera.)

*Hosts*: Pine.

*Injury*: Very serious defoliator.

Description and biology: *Moth* variable in color, from brown red to slate gray, unicolorous or mottled; middle of forewings with white crescent. *Larva* 8 cm. long, with steel-blue stripes on meso- and metathorax, general color varying from reddish to slate gray; pubescence very long and clustered. The larva feeds on the foliage and spins a neat oval silken cocoon.

Distribution: Europe.


*Panolis griseovariegata* Goeze.

(Pine Noctuid. Noctuidae; Lepidoptera.)

*Hosts*: Pine.

*Injury*: Attacks foliage, buds, and tender shoots.

Description and biology: *Moth* with forewings variegated cinnamon red and yellowish gray with white marks; hind wings brownish black. *Larva* green, with three broad white dorsal stripes, a yellowish orange lateral stripe, head shining yellowish, 35 mm. long. *Eggs* greenish, laid in a row on the underside of needles.

Distribution: Europe.


*Evetria buoliana* Schiffermuller.

(European Pine-Shoot Moth. Tortricidae; Lepidoptera.)

*Hosts:* *Pinus silvestris*, *P. laricio*, *P. montana*, *P. strobus*, *P. resinosa*.

*Injury:* Causes deformation of tree. Has been introduced into the United States in nursery shipments.

*Description and biology:* Adult moth 12 mm. long, small, gayly colored; the head and its appendages and thorax light orange yellow, abdomen dark gray; forewings bright ferruginous orange, suffused with dark red, especially toward the tips, and with several irregular forked anastomizing, silvery crosslines and costal strigula; hind wings dark blackish brown; legs whitish, the anterior ones reddish in front. *Pupa* stout, robust, chestnut brown; abdominal segments with rings of short dark spines. *Larva* 16 mm. long, brown with black head and thoracic shield; feeds in the young buds and sheets. *Egg* small, flat, white, laid at base of bud. (See plates XII, XIII.)

*Distribution:* Europe, introduced into United States in 32 nurseries.


*Evetria* spp.

(Pine Bud and Gall Moths. Tortricidae; Lepidoptera.)

*Species:* In addition to *E. buoliana* Schiffermuller which is separately treated, the following species injure pines. *E. resinella* Linnaeus; Europe; makes large galls in twigs of pines. *E. turionana* Hübnner; Europe, North America; attacks buds of pines, especially the terminal bud. *E. pinivorana* Zeller; Europe, North America; attacks the axillary buds. *E. diapiana* Hübnner, Europe, Japan, North America; attacks young shoots. *E. frustrana* Comstock, the Nantucket pine moth, *E. rigidana* Fernald, and *E. comstockiana* Fernald are among our most serious pests in this country.

*Distribution:* The distribution cited above shows clearly that these species are readily distributed in nursery stock.


Thecodiplosis brachyntera* Schwäger.

(Pine Needle Midge. *Itonididae* [Cecidomyiidae]; Diptera.)

*Hosts:* *Pinus silvestris*, *P. laricio*, *P. montana*.

*Injury:* Breeds in the needles, forming a small gall-like swelling.

*Description and injury:* Fly very small. *Larva* yellowish. Egg laid between the bases of two needles.

*Distribution:* Europe.


**D. OTHER INSECTS ATTACKING PINE (PINUS).**

**Hemiptera.**

**Aphididae:**


**Coccidae:**

Armored—

Aspidiotus (*Aonidia*) lauri Bouché; Italy; *Pinus*.

Aspidiotus (*Aonidia*) pinicola Leonard; Cyprus, Spain; *Pinus halepensis*, *P. silvestris*.

Chionaspis austriaca Lindinger; Australia; *Pinus laricio nigricans*. 
CONIFEROUS BARK BEETLES.

Fig. 1.—Polygraphus truchi: Larva; 1a, pupa; 1b, adult female, dorsal view (above) and lateral view (below); 1c, head of female; 1d, antenna; 1e, adult male, dorsal view (above) and lateral view (below). Fig. 2.—Phloeosinus zohbi: Egg; 2a, adult female, dorsal view (above) and lateral view (below); 2b, antenna; 2c, leg; 2d, adult male, dorsal view (above) and lateral view (below). Fig. 3.—Pityogenes coniferae: Adult female, dorsal view (left) and lateral view (right, above figure); 3a, antenna; 3b, leg; 3c, adult male, lateral view (left) and dorsal view (right). (Stebbing.)
European Pine Shoot Moth, Evetria buoliana, Moth, Larva. (Busck.)
Work of Evetria buoliana on Pine Shoots. (Busck.)
Pine Borers.

Fig. 1.—*Capnodis indica*: Larva; 1a, adults. Fig. 2.—*Anthaxia osmastoni*: Larva; 2a, adults. Fig. 1b.—Stem of *Pinus longifolia* showing work of both beetles. (Stebbing.)
The Pine Bark Beetle.
The pine bark beetle (*Platypus biformis*): Males and females and injury to *Pinus longifolia*. (Stebbing.)
INSECTS OF CONIFERS (PINE).

Coleidae—Continued.
Armored—Continued.

Diaspis cisi Schrank; Germany, Italy; *Pinus silicifolia, P. silvestris.

* Lepidopteres nestaneadi Sule; Europe; *Pinus austrina, P. pumilio, *P. silvestris.

Leucaspis leei Collé; Europe; *Pinus spp.

Leucaspis pini Hartig; Europe; *Pinus austrina.

Leucaspis pusilla Low; Europe; *Pinus cembra, P. silvestris.

Leucaspis signoretii Targioni-Tozzetti; Italy, Corsica, Cyprus; *Pinus halepensis, P. laricio; *P. silvestris.

Poliaspis pini Maskell; Japan; *Pinus densiflora, P. austriaca, P. thunbergii.

Unarmored—

Guerrinella serranula Fabricius; Algeria; southern France; *Pinus.

Paicoecus fuscopennis Burmeister; Germany, France; *Pinus silvestris.

Pseudoecus pini Kuwana; Japan; *Pinus.

Puto antennata Signoret; France, Switzerland; *Pinus cembra, P. silvestris.

Aralidae:

Aralus cinnamomeus Panzer; Europe; occurs under bark scales; causes needles to become yellow and remain small.

COLEOPTERA.

Anobiidae:

Ernobius abietinus Gyllenhall; Europe; attacks cones.

Ernobius nigrinus Sturm, and E. pini Sturm; Europe; attacks pith of young shoots.

Hexalobium plumbeum Illiger; Europe; breeds in the dead wood.

Meloidae:

Cantharis fusca Linnaeus; a blister beetle; Europe; attacks shoots.

Buprestidae.

Agrius betuleti Ratzeburg; and *A. viridis Linnaeus; Germany; bores stems of young trees and branches of older trees.

Chrysochthris solieri Laporte et Gory; Europe; bores in bast and sapwood of seedlings of *P. silvestris and P. piniaster.

Coxolthis indica Thomson; India; bores in bast and sapwood of *Pinus longifolia. (See pl. XIV, figs. 11, 12).

Buprestis geometrca Laporte et Gory; India; bores in *Pinus longifolia.

Anthaxia ornata Stebbing; India; bores in bast and of *Pinus longifolia. (See pl. XIV, fig. 2).

Phanops cyanea Fabricius; Europe; bores in bark.

Tenebrionidae.

Melenchion tibiale Fabricius, Gonoccephalus (Opata) sabulosum Linnaeus, and Phytium gibbus Fabricius attack tender roots, bark, and tops of seedlings and nursery stock.

Sectes imosinaica Fairmaire; India; bores in wood of *Pinus excelsa.

Blaps armatus Blair; India; bores in the trunks of *Pinus gerardiana.

Searabidae.

Amphimallon solit Ari Linnaeus; England; injures the roots of *Pinus silvestris.

Melanolota hippocastani Fabricius; M. melolontha Linnaeus; Europe; injure roots of seedling and needles.

Polyphylia fulo Linnaeus; Europe; attacks the roots of seedlings, and the adults feed on the needles.

Cerambycidae.

Acanthocinus woodi Linnaeus; Germany; bores in the sapwood of felled or prepared lumber.

Monobrama pulpo provincialis Olivier; Germany; attacks *Pinus silvestris and P. pinaster.

Nuchidina wardioka Dalman, India; bores in trunks of *Pinus longifolia.

Cinvocophala iberus (?) Sharp; India; bores in bast and sapwood of *Pinus gerardiana.

Chrysomelidae.

Cryptoccephalus pini Linnaeus; Germany; attacks the foliage and bark of young shoots.

Lupentus pinicola Duftschmidt; Germany; attack the foliage and bark of young shoots.

Brentidae.

Eubactrus sp.; India; bores in trunks of *Pinus longifolia.

Rhininaeaeidae.

Rhinocercus attelaboloides Fabricius; a weevil; Germany; breeds in the catkins.

Brachyrhinidae.

Polydrusus chrovodrypis Grell, P. intermedius Zetterstedt, P. undatus Fabricius, P. viasusus Chevrolet; Europe; attack the buds and needles of conifers; the larvac breed at the roots of trees.
Curculionidae.

*Brachonyx pineti* Paykull; weevil; Europe; mines the needles of *Pinus silvestris*.

*Cryptorhynchus brandisi* Stebbing; the chir pine weevil; India; breeds in wood of *Pinus longifolia* and *P. khasya*. (See text fig. 38.)

*Cryptorhynchus raja* Stebbing; India; breeds in bark and sapwood of *Pinus excelsa*.

Cossonidae.

*Mestes aestivalis* Fairmaire; Europe; bores in pine wood standing in sea water.

Ipidae.

*Carphoborus minimus* Fabricius; Germany; makes galleries in branches and tops of *Pinus austriaca*, *P. montana*, and *P. silvestris*.

*Cryphalus longifolia* Stebbing; India; *Pinus longifolia*.

*Cryphalus major* Stebbing; India; *Pinus longifolia*.

*Cryphalus cinereus* Herbst; Germany.


*Hylastes longifolia* Stebbing; India; *Pinus longifolia*.

*Hylurgus ligniperda* Fabricius; Germany; attacks taproots.

*Ips brandfordi* Stebbing; India; *Pinus gerardiana*.

*Ips acuminatus* Gyllenhal; Lapland to Sicily; bark and sapwood.

*Ips longifolia* Stebbing; India, *Pinus longifolia* and *P. gerardiana*.

*Ips manusfeldi* Wacht.; Europe; *Pinus austriaca*.

*Orthotomicus erimos* Voluston and *O. longicus* Gyllenhall; Europe.

*Phloeosinus zohbi* Stebbing; India; *Pinus gerardiana*. (See pl. XI, figs. 2a-2d.)

*Pityogenes trepanatus* Nord.; Europe; *Pinus austriaca*.

---

Fig. 38.—Pine weevil (*Cryptorhynchus brandisi*); Injury to *Pinus longifolia*. (Stebbing.)

*Pityogenes lipperti* Henschel; Dalmatia; Aleppo pine.

*Pityophthorus sampsoni* Stebbing; India; *Pinus excelsa*.
INSECTS OF CONIFERS (PINE).

Ipidæ—Continued.

*Pityophthorus glabratus* Eichhoff; Europe; *Pinus silvestris.*

*Pityophthorus lichtensteini* Ratzeburg; Europe; *Pinus silvestris, P. strobus, P. pinaster.*

*Polygraphus grandicollis* Thomson; Europe; *Pinus strobus.*

*Polygraphus trenchi* Stebbing; India; *Pinus gerardiana.* (See text fig. 39, and pl. XI, figs. 1a–1e.)

*Polygraphus nigra* Stebbing; India; *Pinus excelsa.*

*Polygraphus himalayensis* Stebbing; India; *Pinus longifolia.*

*Polygraphus longifolia* Stebbing; India; *Pinus longifolia.*

*Xyleborus eurygraphus* Ratzeburg; Europe.

![Fig. 39.—Pine bark beetle (*Polygraphus trenchi*): Galleries in *Pinus gerardiana.* (Stebbing.)](image)

Platypodieæ.

*Crosostaurus fairmaiirei* Chapuis; India; bores in wood of *Pinus excelsa.*

*Platypus biformis* Chapuis; India; infests *Pinus longifolia.* (See pl. XV.)

**LEPIDOPTERA.**

Geometridæ.

*Semiaestra liturata* Ckn.; Europe; attacks the needles.

Lasiocampidæ.

*Lasiocampa quercus* Linnaeus; Germany; attacks needles.

Noctuidæ.

*Agrotis tritici* Linnaeus; Europe; injures roots of seedlings.
Pyralidae.

*Dioryctria splendidella* H. Sch.; Germany; attacks cones, shoots, and sapwood.
*Ephesia clatella* Hübner; Germany; attacks seeds and cones.

Psychidae.

*Clania crameri* Westwood; India; attacks needles of *Pinus longifolia*.

---

**Fig. 10.**—Pine web-worm (*Cneothocampa pityocampa*): Nests. (Barbey.)

**Hyponomeutidae.**

*Ocnerostoma piniaricella* Zell.; Germany; attacks needles.

**Cneothocampidæ.**

*Cneothocampa pinicola* Treitschke; Europe; attacks foliage.
*Cneothocampa pityocampa* Schiffermiller; Europe; attacks foliage of *Pinus pinea*, *P. pinaster*, *P. lario*, *P. halepensis*. (See text fig. 10.)
**Hymenoptera.**

*Itycorsia campestris* Linnaeus, a sawfly; Europe; attacks needles. (See text fig. 41.)

**E. Better Known Important Pests of Fir (Abies).**

*Eucosoma nigricanæ* H. Sch. (Epiblema).

(Host: Silver fir (*Abies pectinata* D. C.).

**Injury:** Feeds in the buds. Very likely to be introduced in buds on nursery stock during winter.

**Description and biology:** *Moth* wing expanse 11–13 mm., forewings dark brown with violet red shimmer and lead gray lines. *Larva* yellowish to reddish brown, with black head and thoracic shield. Feeds in the buds, hibernating as a larva. In the spring it goes from bud to bud, often under a silken web. Pupates in the ground.

**Distribution:** Europe (Germany).

*Enarmonia rufimitra* H. Sch. (Steganopticha).

(Redheaded Fir Worm. Tortricidæ; Lepidoptera.)

(Hosts: Silver fir (*Abies pectinata* D. C.).

**Injury:** Feeds on the needles and young shoots.

**Description and biology:** *Moth*, wing expanse 12–16 mm., head and thorax rust yellow, forewings yellowish gray with many lead-colored lines. *Larva* dirty yellow green, with rust-red head. (See text fig. 42.)

**Distribution:** Europe.


*Nüsslin, Otto.* Leitfaden der Forstinsektenkunde, 2d ed., 1913, p. 408, figs. 338.
Plemelella abietina Seitner.

(Spruce Seed Midge. Itonididae [Cecidomyiidae]; Diptera.)

Host: Fir (Abies).

Injury: Breeds in the seed, which become shrunken and worthless.

Description: Larvae red.

Distribution: Europe.


F. OTHER INSECTS ATTACKING FIR (ABIES).

HEMIPTERA.

Aphididae.

Lachnus grossus Kaltenbach and L. piceæ Walker, plant lice; Europe (Germany); live on the bark.

Lachnus pichtæ Mordwillo; Europe; lives on the under side of the needles.

Prociphilus bumelie Schrank, a root louse; Europe; attacks roots of Abies pectinata, A. balsamea, and A. fraseri. (See Ash.)
INSECTS OF CONIFERS (FIR, SPRUCE).

Coccidae:

- Armored—
  - *Lepidosaphes abietis* Signoret; Europe; *Abies*.
  - *Poliaspis pinii* Maskell; Japan; *Abies firma*.

- Unarmored—
  - *Lecanuim sericeum* Lindinger; Bavaria; *Abies pectinata*.

COLEOPTERA.

- *Coccididae.*
  - *Armored—*
    - *Lepidosaphes abietis* Signoret; Europe; *Abies*.
  - *Poliaspis pinii* Maskell; Japan; *Abies firma*.

- *Unarmored—*
  - *Lecanuim sericeum* Lindinger; Bavaria; *Abies pectinata*.

- *Coleoptera.*
  - *Lymexylonidae.*
    - *Hyleccetus dermestoides* Linneus; Germany; bores in white fir wood.

- *Elateridae.*
  - *Athous hirtus* Herbst; Europe; attacks seedlings of fir.

- *Cerambycidae.*
  - *Molorchus minor* Linneus; Germany; attacks the sapwood of felled trees and lumber.
  - *Tetropium fusum* Fabri; Germany; bores in trunks of old and dead trees.

- *Ipsida.*
  - *Cryphalus stroheckerii* Stebbing; India; *Abies webbiana*.

- *Scolytinae.*
  - *Scolylopteryx himalayensis* Stebbing; India; *Abies webbiana*.

- *Tortricidae.*
  - *Tortrix murinana* Hübner; Europe; attacks needles and young shoots of *Abies pectinata*.
  - *Laspeyresia parvula* H. Sch.; Europe; mines the needles.
  - *Laspeyresia coniferana* Ratzeburg; Germany; bores in the bark of *Abies pectinata*.
  - *Oideneutes hercyniana* Treitschke; Europe; attacks needles of *Abies pectinata*.

LEPIDOPTERA.

- *Callimonomidae.*
  - *Megastigmus borriesi* Crosby; a chalcid; Japan; breeds in seed of *Abies maricaii*.

G. BETTER KNOWN IMPORTANT PESTS OF SPRUCE (PICEA).

**Laspeyresia pactolana** Zetterstedt (Grapholitha)

(Spruce Bark Tortricid. Tortricidae; Lepidoptera.)

**Host:** Spruce (*Picea excelsa*).

**Injury:** Breeds in twigs, causing a swelling and deformation, or the death of the outer parts.

**Description and biology:** Moth, wing expanse 12–16 mm., forewing fringed, olive brown with double white angled fascia at the middle and several white marks beyond this; hind wings gray-brown, fringed. **Larva,** 10–12 mm. long, five pairs of abdominal legs, whitish to reddish in color, head and thoracic shield yellowish brown. (See text fig. 43.)

**Distribution:** Germany.

**Hess, Richard.** Der Forstschutz, 1898, vol. 1, pp. 483, 485, fig. 172.


Laspeyresia strobiella Linnaeus (Grapholitha).

(Spruce Cone Moth. Tortricidae, Lepidoptera.)

Host. — Spruce (Picea excelsa).
Injury. — Breeds in the cones.

Description and biology. — Moth, wing expanse 10–14 mm., forewings dark gray brown, fringed, with fine whitish lines, hind wings gray brown, with white fringe. Pupates in the cones. Larva 11 mm. long, yellowish white with light brown head and thoracic shield. The larva breeds in the cones. Eggs laid on the young green cones.

Distribution: Germany.


Fig. 43.—Spruce bark tortricid (Laspeyresia pacotana): Injury. (Nüsslin.)

Laspeyresia tedella Clerck (Epiblema)

(Spruce Nest-Worm. Tortricidae; Lepidoptera.)

Host: Spruce (Picea excelsa, Picea sitchensis).
Injury: Injures the needles.

Description and biology: Moth, wing expanse, 12 mm.; forewings golden brown, with brown silvery transverse fascia and finer markings. Larva light yellowish brown or greenish with two dorsal lines. Head and thoracic shield brownish black, flecked;
9 mm. long. The larvae spin nests among the needles. *Pupate* in the ground, where the larvae hibernate.

**Distribution:** Europe (Germany).


**NüSSLIN, OTTO.** Leitfaden der Forstinsektenkunde, 2d ed., pp. 412, 413, figs. 344, 345.

**Dasyneura abietiperda** Henschel; **Dasyneura piceæ** Hartig.

(Spruce Gall Midge. *Itonididae* [Cecidomyiidae]; *Diptera*.)

**Host:** Spruce.

**Injury:** Attack twigs at the base of needle clusters, injuring dormant buds and sometimes killing entire twig.

**Description:** Europe (Germany).


**Reseliella piceæ** Seitner.

(Spruce Seed Midge. *Itonididae* [Cecidomyiidae]; *Diptera*.)

**Host:** Spruce.

**Injury:** Breeds in the seed.

**Description and injury:** Fly, yellowish red with dark bands, 2-4 mm. long. *Larva*, 4 mm. long, rose-red. *Eggs* laid in young green cones.

**Distribution:** Europe.


**H. OTHER INSECTS ATTACKING SPRUCE (PICEA).**

**HEMIPTERA.**

**Aphididae.**

*Lachnus grossus* Kaltenbach, *L. fusciatus* Kaltenbach, *L. piceæ* Walker, and *L. pinicola* Kaltenbach plant lice; Europe; attack stems, twigs, and tender growth.

**Coccidæ:**

Unarmored—

*Phenacoccus piceæ* Löw; Europe; *Picea excelsa*.

*Physokermes piceæ* Schrank; Europe; *Picea abla, P. excelsa, P. pungens, P. sitchensis*.

Armored—

*Syngenaspis parlatorex* Sulc.; Bohemia, Bosnia; *Picea excelsa, P. omorica*.

**COLEOPTERA.**

**Carabidae.**

*Calathus fuscipes* Goeze, *Ophonus pubescens* Müller, *Harpalus xncus* Fabricius, and *Pterostichus lepidus* Leske, ground beetles, are destructive to the seed in Europe.

**Elateridae.**

*Lacon sp. near daridi* Fairmaire; India; breeds in trunks of *Picea morinda*.

**Cerambycidae.**

*Tetedopus dorcadioides* Pascoe; a wingless longicorn; India; breeds in trunks of *Picea morinda*.

*Leptura rubriola* Bates; India; breeds in the trunks of *Picea morinda*.

**Ipidae.**

*Cryptopus morinda* Stebbing; India; attacks *Picea morinda*.

*Hylosus emarginatus* Erichson; Germany; attacks bark and roots.

*Hylophlus glutinosus* Zetterstedt; Germany, Siberia.

*Philophasma rhododactylus* Mannerheim; Europe; *Picea excelsa*.

*Philophasma spinulosus* Rey; Europe; attacks branches.

*Philophasma exsulcatus* Ratzeburg; Europe.

*Dryocates indicus* Stebbing; India; attacks *Picea morinda*.

**Platypodidae.**

*Crossotarsus coniferæ* Stebbing; India; bores in wood of *Picea morinda*.

27812—18—6
LEPIDOPTERA.

Tortricidae.

Tortrix histrionana Froelichs: Germany; attacks shoots.

Hyponomeutidae.

Argyresthia illuminatella Zell.; Germany; attacks buds and young shoots.

HYMENOPTERA.

Tenthredinidae.

Lygrosomenus pini Ratzeburg; the small spruce sawfly; Europe; defoliates and injures buds and young shoots.

Lygrosomenus ambigvus Falleni and L. saesenni Hartig; Europe; defoliators.

Siricidae.

Sirex imperialis Kirby, the spruce wood wasp; India; bores in wood of Picea morinda Lind. Sirex spectrum Linnaeus; Europe. (See text fig. 44.)

I. BETTER KNOWN IMPORTANT PESTS OF LARCH (LARIX).

Eriophyes laricii von Tubeuf.

(Larch Blister Mite. Eriophyidae; Acarina.)

Host: Larch [Larix decidua (europaea)].
Injury: Forms gall-like deformations of the terminal bud.

Fig. 41.—Spruce wood wasp (Sirex spectrum): Adult attacking Picea. (Barbey).

Description and biology: A four-legged blister mite which forms gall-like swellings of the terminal or axillary buds. Very easy to introduce on nursery stock.
Distribution: Europe.

von Tubeuf. Forst. naturw. Zeitschr., 1897, Bd. 6, pp. 120–124, 3 figs.

Coleophora laricella Hübnem.

(Larch Needle Miner. Elachistidae; Lepidoptera.)

Host: Larch [Larix decidua (europaea)].
Injury: Attacks early buds and mines the needles. The injury is great. Easily introduced in nursery stock.
Description and biology: Adult moth 3 mm. long, with wing expanse 9 mm., forewing brownish gray, faintly shining, wings fringed with long hairs. Larva dark reddish brown, the little head, thoracic shield, and anal portion dark, 5 mm. long. The larva mines needles and buds. Pupates in a sack or case.
Distribution: Europe.

Argyresthia laevigatella H. S.
(Larch Shoot Moth. Hyponomeutidae; Lepidoptera.)

Host: Larch (Larix europaea).
Injury: Very injurious to young shoots.
Description and biology: Larva 6–7 mm. long, bright yellow, with black head, feeds under the "ark" of young larch shoots. After hibernating the larva is somewhat reddish with dark lines. Eggs laid singly at bases of needles.
Distribution: Europe.


Dendrolinus sibiricus
Tscherewikoff.
(Larch Spinner. Lasiocampidae; Lepidoptera.)
Host: Larch.
Injury: Considerable.
Description: Similar to D. pini L.
Distribution: Ural.

Tscherewikoff.

Laspeyresia zebeanza Lathsburg (Grapholitha).
(Larch Gall Moth. Tortricidae; Lepidoptera.)
Host: Larch (Larix europaea).
Injury: Forms galls on twigs, giving admission to disease or causing deformity. Likely to introduction in nursery stock during the winter.
Description and biology: Moth, wing expanse 17 mm., forewings grayish black with whitish transverse lines on the costal margin. Larva dirty yellow green with brown thoracic shield, 10 mm. long. The larva attacks the twigs at the axils of branches forming a gall-like swelling. (See text fig. 45.)
Distribution: Germany.
Dasyneura laricis F. Lw.

(Larch Bud Gall Midge. Tonididae [Cecidomyiidae]; Diptera.)

Host: Larch.

Injury: Attacks buds, forming galls.

Description and biology: Eggs laid at base of needle clusters. The larvae enter the dormant buds forming a gall-like swelling, and overwinter as very small larvae. They develop in the buds through the year. Pupate in cocoon in autumn. The attacked buds die.

Distribution: Europe.


J. OTHER INSECTS ATTACKING LARCH (LARIX).

HEMIPTERA.

Aphididae.

Lichnu1 laricis Koch, a plant louse; Europe; attacks needles and young shoots.

COLEOPTERA.

Anobiidae.

Dryophilus pusillus Gyllenhal; Europe; attacks buds.

Ipidae.

Gryphalus intermedius Ferrari; Germany.

LEPIDOPTERA.

Hyponomeutidae.

Argyresthia haniyateilla H. Sch.; Germany; attacks young shoots.

L. BIBLIOGRAPHY OF PRINCIPAL WORKS CONSULTED.

Bargagli, P. Rassegna Biologica Rincofori Europei, 1883-1887.


Hess, R. Der Forstschutz, vols. 1, 2, 1898.

Lindner, L. Die Schildläuse (Coccidae), 1912.

Nüsslin, O. Leitfaden der Forstsinsektenkunde, 2d ed., 1913.


Trägardh, Ivar. Sveriges skogsinsektor, 1914.

CORN; MAIZE.

(Zea mays Linnæus. Family Gramineae.)

Although the greater part of our commerce in corn is in the nature of exports, there are always likely to be imports of seed corn from various parts of the world. Corn is probably American in origin, and consequently there are few foreign pests not already widely distributed in the country.

A. CORN INSECTS LIKELY TO BE IMPORTED.

* Araecerus fasciculatus De Geer.

(Coffee-bean Weevil. Family Anthribidae; Coleoptera.)

Hosts: This weevil is polyphagous, feeding in dry food products and drugs, chinaberry (Melia azadarach), dead cotton bolls, cornstalks, etc.

Injury: Very injurious to food products and also to live corn.
**Description:** A mottled grayish weevil with short, blunt snout. Larva hairy.

**Distribution:** Cosmopolitan.


**Dichrocoels punctiferata** Guené.

(Pyralidae; Lepidoptera.)

**Hosts:** Maize, peach, pawpaw, apple, orange, loquat, guava, cassia, custard apple, granadilla, banana, millet, *Canavalia indica*, senna bean, *Dahlia*, castor bean, cacao, sunflower.

**Injury:** Although primarily a maize pest, it is becoming quite a serious enemy of fruit trees in Cleveland District, Queensland. Breeds in pods of castor bean and cacao, and heads of sunflower in India.

**Description and biology:** Adult measures about 24 mm, in wing expanse; color pale orange yellow, marked with numerous black dots on wings and body. Egg presumably deposited on leaf stalk near or at point of junction with main stem or young fruit; larva on hatching penetrates into the hollow stalk or fruit, and after feeding for a time bores into the crown, in which it remains until ready to pupate. On leaving the crown of the fruit it crawls to some convenient crevice and constructs a loose silken web under which it transforms to a reddish brown pupa.

**Distribution:** Australia, Japan, China, India, Burma, Ceylon.

JARVIS, E.  Queensland Agricultural Journal, 1913, p. 33, July.


**Siphonella pupillalis** Bjerk.

(Corn Fly. Oscinidae; Diptera.)

**Host:** Corn.

**Injury:** Mines stem and young ears.

**Description and biology:** Fly yellow, thorax with three broad black stripes, abdomen with brown median line and four broad brown cross bands; beak very long and thin; appendages yellow; length 3–4 mm. Larva 6–7 mm. long, shining yellowish white.

**Distribution:** Europe.


### B. IMPORTANT CORN PESTS.

#### HEMIPTERA.

**Cercopidae.**

*Tomaepis varia* Fabricius, *T. postica* Walker, *T. lepidior* Font.; South America. (See Sugar cane.)

**Coleoptera.**

**Elateridae.**

*Agrioidea lineatus* Linnaeus. (See Tobacco.)

**Chrysomelidae.**

*Diasaurica graminis* Baleau; Porto Rico; adults very injurious to flowers.

**Brachyrhinidae.**

*Biaepripties abbreviatus* Linnaeus; West Indies. (See Sugar cane.)

**Lepidoptera.**

**Noctuidae.**

*Stenania cretica* Led.; Europe, Asia Minor, Egypt, Sudan; bores in ears. (See Sugar cane.)

*Cheirumia fusca* Hampson; South Africa; a serious pest.

*Gyphus tenuosticha* Hampson; East Africa; cobworm.

**Pyralidae.**

*Pyrausta nubilalis* Hübner; Europe; bores in stalks. (See Grains.)

*Chilo simplex* Butler; India, Formosa. (See Sugar cane.)

*Chilo auricilia* Dudgeon; India. (See Rice.)

**Heptalidae.**

*Heptalus humuli* Linnaeus; Europe. (See Hops.)
COTTON.

(Gossypium spp. Malvaceae.)

Many species of fiber yielding cotton are cultivated in various parts of the world, and the fiber is a very important article of world commerce. The great impetus given to seed selection in recent years has also caused considerable commerce in the various varieties of seed for planting. Practically the only serious possibility of importing cotton insects is connected with the seed and with lint when not thoroughly cleaned of seed. There is also some danger of injurious insects finding refuge behind the bagging of the bales. Owing to these dangers the Federal Horticultural Board has forbidden the importation of cotton seed except through the Department of Agriculture, and has placed restrictions on the importation of foreign baled cotton.

The cotton plant is one of the most severely attacked cultivated plants, having a very long list of injurious insects. Although the majority of these insects are not liable to introduction, there is always a possibility that they may find entrance into the country in the folds of the bagging of bales or on some food plant.

A. BETTER KNOWN COTTON INSECTS LIKELY TO BE IMPORTED.

Eriophyes gossypii Banks.

(Cotton Blister Mite. Eriophyidae; Acarina.)

Host: Cotton.

Injury: Injures the foliage, causing death to plants when very numerous. May be distributed on lint or seed.

Description and biology: A tiny four-legged mite which forms blisters on the leaves of cotton when very young, developing therein. This is a very serious pest.

Distribution: West Indies.


Dysdercus spp.

(Cotton stainers. Pyrrhocoridæ; Hemiptera.)


Hosts: Cotton, okra, eggplant, and various other plants.

Injury: Serious.

Description and biology: Adult active sucking bugs, usually reddish or yellowish in color. The developmental stages are gradual, each nymphal molt showing a little more of the wings. The eggs are small, oval, yellowish, laid in clusters on the ground. The insect in all stages lives by sucking the juices of the cotton plant, especially the
Apion xanthostylum Wagner.

(East African Cotton Weevil. Apionidae; Coleoptera.)

Host: Cotton.
Injury: Bores in the stem and bolls.

Description and biology: A very small black weevil. The larva is yellowish white, 2 mm. long, curved and legless. It bores in the stem and roots as well as in the bolls of cotton and is a very serious pest.

Distribution: German East Africa.


Apion armipes Wagner.

This species is similar to the above mentioned and attacks cotton in a similar manner in Nyasaland. (Zacher., l. c., p. 156, fig. 21.)

Anthonomus vestitus Boheman.

(Peruvian Cotton-Square Weevil. Curculionidae; Coleoptera.)

Host: Cotton.
Injury: Very injurious pest to squares in Peru.

Description and biology: Adult weevil resembles the Mexican cotton boll weevil (A. grandis); length 2.5-4 mm.; o’long-ovate, convex, blackish piceous, rather closely clothed with elongate whitish scales, with indistinct oblique lighter band on each elytron, the two forming a basal triangle. Pupa white, formed in fallen squares. Larva white, curved, legless; feeds in the interior of cotton squares which fall to the ground soon after the larva commences to feed. Egg oval, white, laid in square (see text fig. 47).

Distribution: Peru.


Earias insulana Boisduval.

(Egyptian Cotton Bollworm. Cymbidae; Lepidoptera.)

Host: Cotton.
Injury: Very injurious; the larvae feed in the bolls and squares. Adults have been captured in quarantine in a few bolls of cotton from the island of Cyprus shipped for propagation and botanical purposes.
Description and biology: Adult moth green, front wings with two indistinct lines, hind wings whitish. Larva brownish to greenish with yellow flecks 15 mm. long (see plate xvi, figs. a, b, c, e, g, h).

Distribution: India, Siam, Burma, Australia, Africa, Cyprus.


Pectinophora gossypiella Saunders (Gelechia).

(The Pink Bollworm. Gelechiidae; Lepidoptera.)

Host: Cotton.

Injury: Breeds in the bolls, especially in the seed. Liable to be imported in cotton seed. Live specimens have been taken in quarantine in the United States. Some of these were in stray seeds in baled cotton.

Description and biology: Moth—small, gray colored, less than half an inch long, with long brown fringes on the wings. Pupa brown, less than half an inch in length. Larva white when very young, but becoming pink; feeds in green or ripe bolls. first attacking the leaves or outside of bolls; later it bores inside of the boll, feeding on the seed. The larval period is sometimes very greatly retarded. Eggs deposited singly on leaves, stalks, and bolls hatch in a few days. (See text fig. 48.)

Has become established in the Laguna District, State of Coahuila, Mexico.


Pyroderces simplex Walsingham.

(The Little Bollworm. Gelechiidae; Lepidoptera.)

Host: Cotton.

Injury: Breeds in the bolls, especially in the seed.

Description and biology: Adult moth light brown, with black and white markings, length 6 mm. Larva pink, 8 mm. long. Pupa light brown, 5 mm. long. The species greatly resembles Pectinophora gossypiella but is smaller and differently marked. It breeds in the same manner.

Distribution: East Africa.

Morstatt, H. Der Pflanzer, Jahrg. 10, beihett 1, 1914, pp. 29-31.
COTTON BOLLWORMS.

The Cotton Spittle-Tube Insect.

The cotton spittle-tube insect (*Macrostreta planitissa*); Fig. a.—Eggs on cotton stem; b, egg imbedded in tissue of stem; c, egg; d, nymph, 19 days old; e, calcareous case of nymph, 20 days old; f, case with molted skin attached; g, male; h, female; i, side view of adult. (Maxwell-LeFroy.)
The Cotton Stem-Borer.

The cotton stem-borer (*Sphenoptera gossypii*): a, Larva in stalk; b, larva; c, pupa in stalk; d, pupa; e, adult; f, adult on plant; g, parasite. (Maxwell-Lefroy.)
HEMIPTERA.

Cercopidae.
*Macaronota planita* Distant; India; makes tubes on stems, sucks juices. (See pl. XVII.)

Lygaeidae.
*Oxyacarus gossipinus* Distant; of West Africa; *O. dudgeoni* Distant of West Africa; *O. hyalinipennis* Costa of Egypt; *O. latus* Kirby of Ceylon, India, Burma; attack cotton seed.
*Oncopeltus quadriguttatus* Fabricius; Australia; oviposits in stems.

Fig. 51.—Mole cricket (*Schizodactylus monstrus*). (Maxwell-Lefroy.)

COLEOPTERA.

Scarabaeidae.
*Adoretus umbrosus* Fabricius, and var. *tenuimaculatus* Waterhouse; Hawaii, Philippines, Japan, Java. (See Rose.)

Fig. 52.—Cotton stem-borer (*Sphenoptera neglecta*): *a*, Egg; *b*, pupa, *c*, adult; *d, f, g*, injury; *e*, larva. (Zacher.)

Buprestidae.
*Sphenoptera neglecta* Klug (see text fig. 52), Egypt, and *S. gossypii* Kerr, India; bore in stalks. (See plate XVIII.)
INSECTS OF COTTON, COWPEA, CRUCIFERS.

Curculionidae.
*Phyllitis* sp.; India; and *Gasteroceros gossypii* Pierce, Peru; bores in stalks. (See pl. XIX, figs. 2, 3, 4.) (Pierce, W. D., U. S. Dept. Agr., Off. Secy., Report 162, 1915, plate I.)

Anthribidae.

*Anaceraeus fasciculatus* DeGeer; India; breeds in seed (see pl. XIX, fig. 1.) (See Corn.)

LEPIDOPTERA.

Phytilidae.

*Phycita infusella* Meyrick; India; attacks buds.

Pyralidae.

*Cryptoblabes gnidaea* Miller; Egypt, Europe; breeds in bolls.

*Sylepta derogata* Fabricius; India; rolls leaves.

Cossidae.

*Zeuzera coffeae* Nietner; Orient; bores in stalks. (See Coffee.)

Cymbidae.

*Earias fabia* Schiffermiller; Europe, Asia, East Africa, Canary Islands, Madeira, South Africa; cutworm.

*Prodenia litura* Fabricius; Egypt, Uganda, India, Philippines; defoliator.

*Diparopsis castanea* Hampshire; Africa; boll worm.

*Sacaodes pyrallis* Dyar; South America, Trinidad; boll worm.

*Tarachia catena* Sow.; India; defoliator.

Arctiidae.

*Diacrisia obliqua* Walker; India, Japan, China; defoliator.

Lymantridae.

*Perthis virguncula* Walker; India, Uganda; defoliator.

COWPEA.

*(Vigna unguiculata* Walp. Family Leguminosae.)

The cowpea is extensively raised in the country as well as many other parts of the world. Shipments of the peas might easily introduce pests. (See Beans, Peas.)

CRUCIFERS.

(Family Cruciferae.)

Various insects attack several species of crucifers and for convenience are grouped under a general heading.

Phyllostreta spp.

(Crucifer Leaf Beetles. Chrysomelidae; Coleoptera.)

Species: *Ph. undulata* Kutsch; Europe; cultivated crucifers. *Ph. nemorum* Linnaeus; Russia; rhubarb, hops, cabbage. *Ph. atra* Fabricius; Europe; crucifers. *Ph. cruciferex* Goee; Europe; crucifers. *Ph. nigripes* Fabricius; Europe; cabbage, radish, horseradish, rape, *Reseda.* *Ph. armoracix* Koch; Europe, introduced into North America; crucifers, horseradish.

Injury: The adults of all of these species feed on the foliage of cruciferous plants. The larvae are not all known but they usually attack the stem or roots. The fact that two of the species have been introduced into this country indicates the possibility of the others also gaining admission.

Description: The first two species are yellow striped, the others unicolorous.


A MANUAL OF DANGEROUS INSECTS.

Ceutorhynchus contractus Marsh.

(The Charlock Weevil. Curculionidae; Coleoptera.)

Injury: This minute weevil sometimes does great harm early in the season to young sprouting mustard plants by devouring the germinating seed or the young plant just below the surface of the ground.

Host: Charlock, (Brassica arcensis Linn.)

CUCURBITS; MELONS; CUCUMBER.

(Family Cucurbitaceae.)

There are many species of melons grown in various parts of the world, but the only danger of importation comes from pests of the seed and fruit.

A. BETTER KNOWN CUCURBIT INSECTS LIKELY TO BE IMPORTED.

Epilachna spp.
(Cucurbit Ladybird Beetles. Coccinellidae; Coleoptera.)

Species: Epilachna chrysomelina Fabricius; Mediterranean region, Sudan, German East Africa; cucurbits, Sesamia. E. 28-punctata Fabricius; Asia, Malaysia, Australia; Solanaceae, Cucurbitaceae. E. dodecastigma Mulsant; Asia, Malaysia, Australia; Solanaceae, Cucurbitaceae. E. argus Fourcroy; Southern Europe; Bryonia dioica and other cucurbits.

Injury: Defoliate.

Description: Beetle of E. chrysomelina round, very convex, yellowish red with six round black spots on each elytron; length 7-9 mm. The larvæ as well as the adults feed on the foliage.


Aulacophora olivieri Guérin.

(Banded Pumpkin Beetle. Chrysomelidae; Coleoptera.)

Hosts: Cucurbitaceae, pumpkin, marrow, cucumber, gourd, peach, nectarine.

Injury: Very serious. The adults skeletonize the leaves, and eat the flowers; the larvæ feed in the roots and lower parts of the stem.

Description: Beetle about 8 mm. long; orange yellow with large black spots at humeri and beyond middle on each elytron. The adults are rather gregarious in habits.

Distribution: Australia.


Baris traegardhi Aurivillius.

(Melon Weevil. Curculionidae; Coleoptera.)

Hosts: Sweet melons.

Injury: Breeds in the fruit among the seed.

Description and biology: Adult weevil 4 to 6 mm. long, black, with a long slender curved beak, antennæ elbowed and clubbed. Pupa white, with appendages folded beneath. Larva white, legless, with light brownish head.

Distribution: Sudan.

INSECTS OF CUCURBITS, Currant, Custard Apple.

Carpomyia pardalina Bigot.

Hosts: Melons. 
Injury: Serious.

Description and biology: Adult fly, wing expanse 11 mm., wings with three yellowish bands, color light brown, thorax with black and white spots. Larva feeds in fleshy fruits, pupates in the soil. Egg laid in skin of fruit.

Distribution: India.


Dacus cucurbitae Coquillett.

Hosts: Cucurbitaceae (melons, gherkins, etc.), tomatoes, beans.
Injury: Breeds in fruits and stems.

Description and biology: Fly marked with red, brown, yellow, black, and white; wing with brown band and apical spot. Eggs laid on skin of fruit.

Distribution: India, Ceylon, Hawaii.


B. OTHER IMPORTANT CUCURBIT INSECTS.

Trypetidae.

Ceratitis capitata Wiedemann, attacks squash. (See Fruit.)
Dacus ferrugineus Fabricius; India, etc. (See Fruit.)
Bactrocera tryoni Froggatt; Orient. (See Fruit.)
Rhopoetes pardalina Bigot; India; attacks fruit.

Lepidoptera.

Pyralidae.

*Pionea ferrugalis* Hüblner; Europe, Asia, North America. (See Cabbage.)

CUSTARD APPLE; SOUR SOP.

(Annona spp. Family Anonaceae.)

Tropical trees cultivated for their large fruits. Some of the species have been introduced into Florida.

A. A BETTER KNOWN SPECIES LIKELY TO BE IMPORTED.

Anomepestis bengalella Ragonot.

(Custard-apple Caterpillar. Phycitidae; Lepidoptera.)

Host: Custard apple (*Annona squamosa*).
Injury: Injures fruit by tunneling.

Description: Adult female length 22 mm.; fore wings dark green, hind wings brownish-gray with purplish tint, head and thorax brownish-ochreous, abdomen ochreous.

Distribution: India.


B. OTHER IMPORTANT ANNONA INSECTS.

Hemiptera.

Coccidae:

Armored—

Aepidetus (Chrysonphalus) personatus Comstock; Porto Rico; *Annona reticulata*, *A. muricata*.

Aulacaspis miranda Cockerell; Mexico; *Annona cherimola*.
Coccidae—Continued.

Unarmored—

*Ceroplastes denudatus* Cockerell; Grenada, Antigua, Demerara; *Annona muricata*.

*Ceroplastes quadrilineatus* Newstead; British East Africa, Uganda; *Annona muricata*.

*Ceroputs yuccae* Coquillet; Mexico, California; *Anona cherimola*.

*Coccus marsupialis* Green; *Ceylon*.

*Icerya alboluta* Cockerell; West Africa; *Annona squamosa*.

^Ceroputs yuccae^ Coquillet; Mexico, California; *Annona cherimola*.

*Coccus marsupialis* Green; *Ceylon*.

*Icerya alboluta* Cockerell; West Africa; *Annona squamosa*.

^Pseudococcus bromellii^ Bouché; Hawaii; *Annona muricata*.

*Saissetia nigra* Nietner; West Indies; *Ceylon*.

**LEPIDOPTERA.**

*Pyralidse.*

*Dichocrocis punctiferalis* Guénée; Queensland. (See Corn.)

**DIPTERA.**

*Trypetidse.*

*Anastrepha fraterculus* Wiedemann, attacks *Annona humboldtiana*. (See Fruit.)

*Ceratitis capitata* Wiedemann; attacks *Annona muricata*. (See Fruit.)

*Ceratitis ananx* Giaham.; Ahica,; attacks *Annona muricata*. (See Fruit.)

**CYPRESS.**

(*Cupressus* spp. Family Juniperaceae.)

Trees or shrubs with aromatic evergreen foliage in Central America., California, Arizona, Southern Europe to Southeast Asia, valuable for timber and ornament.

**INSECTS INJURIOUS TO CYPRESS (CUPRESSUS).**

**HEMIPTERA.**

*Coccidae:*

Armored—

*Chionaspis striata* Newstead; Algeria, Egypt, California, Arizona.

*Diaspis visci* Schrank; Europe; *Cupressus funebris*, *C. glauca*, *C. macrocarpa*, *C. pyramidalis*, *C. sempervirens*.

Unarmored—

*Gueriniella serrata* Fabricius; Algeria, Southern France.

**COLEOPTERA.**

*Diadoxus scalaris* L. & G., and *D. erythrus* White; Australia; bore in *Cupressus lambertiana*.

**BIBLIOGRAPHY.**

LINDINGER, L., *Die Schilddiäse (Coccidae)*, 1912.


**CYPRESS; CEDAR.**

(*Chamaecyparis* spp. Family Juniperaceae.)

Evergreen trees of North America and Japan, highly valued for timber and useful ornamental trees.

**INSECTS INJURIOUS TO CHAMAECYPARIS.**

**HEMIPTERA.**

*Coccidae:*

Armored—

*Diaspis visci* Schrank; Europe; *Chamaecyparis nothacensis*, *C. obtusa*, *C. pisifera*.

**BIBLIOGRAPHY.**

LINDINGER, L. *Die Schilddiäse (Coccidae)*, 1912.

**DATE PALM.**

(*Phoenix dactylifera.* Family Palmaeae.)

A palm cultivated for its fruit, the date of commerce. (See Palms.)
DOGWOOD.

*Comus spp.* Family Cornaceae.

Hardy ornamental shrubs or trees of the northern hemisphere and Peru. The bark of some species is used in obtaining a substitute for quinine, for tooth powder, black ink, etc.; the bark of the roots yields a scarlet dye, the wood is hard and good for tool handles.

**IMPORTANT DOGWOOD INSECTS.**

**HEMIPTERA.**

**Coccidae:**
- Armored: *Chionaspis salicis* Linnaeus; Europe; *Comus sanguinea*.
- Unarmored: *Lecanium coryli* Linnaeus; Europe; *Comus sanguinea, C. sericea*.

**DURRA.**

See Sorghum.

**EGGPLANT.**

*Solanum melongena.* Family Solanaceae.

A tropical vegetable now extensively cultivated in this country for its fruit.

**A. EGGPLANT INSECT LIKELY TO BE IMPORTED.**

*Leucinodes orbonalis* Guénée.

*Eggplant Fruit Borer. Pyralidae; Lepidoptera.*

**Host:** Eggplant.

**Injury:** Bores in the fruit.

**Description and biology:** Adult wing expanse 24 mm., white, forewing with fulvous, black and ferruginous markings; hind wing white, with black lines and specks. 

**Larva** about 15 mm. long, flesh color, with brown head and shield; a few short hairs on round dark spots.

**Distribution:** India, Java, Burma, Ceylon, South Africa.


**B. IMPORTANT EGGPLANT INSECTS.**

**DIPTERA.**

**Trypetidae.**

*Lonchaea splendida*; New Zealand, Australia, Oceanica; attacks fruit. (See Tomato.)

**LEPIDOPTERA.**

**Noctuidae.**

*Micromima olivia*; Cuba; leaf roller on tomato, tobacco and eggplant.

**ELM.**

*Ulmus spp.* Family Urticaceae.

Ornamental deciduous trees distributed throughout the colder and temperate regions of the northern hemisphere, some of them much valued as avenue trees. The wood is very hard and valuable in the manufacture of implements.

**IMPORTANT ELM INSECTS.**

**HEMIPTERA.**

**Aphididae.**


**Coccidae.**

Armored—

*Chionaspis salicis* Linnaeus; Europe; *Ulmus campestris*. 
COLEOPTERA.

Bostrichidae.
Sinoiylon perforans Schr.; Europe; bores in branches.

Xylonites relusiis Olivier; Europe; bores in branches and trunks.

Buprestidae.
Lampra decipiens Mannerheim and L. rutilans Fabricius; Europe; bore in the bark, bast and sapwood.

Scarabaeidae.
Cerambycidae.
Scolytidae.
Scolytus multistriatus Marsham; Europe (see text fig. 53).

Notodontidae.
Phalera bucephala Linnaeus; Europe. (See Forests.)

Notcelidae.
Xytilus socia Rott.; Europe. (See Plum.)

Geometridae.
Borinna crepuscularia Hübner; Europe, Asia. (See Cinchona.)
Hibernia foliaria Linnaeus; Europe; defoliator.
Lariccia dilutata Borch.; Europe; defoliator.

LITERATURE.

Nüsslin, O. Leitfaden der Forstinnsektenkunde, 2d ed., 1913.
Hess, R. Der Forstschutz, 1898, 1900.
Sterding, E. P. Indian Forest Insects, Coleoptera, 1914.
Bargagli, P. Rassegna Biologica Rinconfori Europei, 1883-87.
Lindinger, L. Die Schiildiäuse (Coccide)., 1912.
Valuable Australian trees recently introduced into California.

A. BETTER KNOWN EUCALYPTUS INSECTS LIKELY TO BE IMPORTED.

*Melis profana* Fabricus.

*(Gum-tree Bug. Coreidae; Hemiptera.)*

*Hosts:* *Eucalyptus viminalis, Acacia decurrens, A. mollissima,* orange, other citrus fruits.

*Injury:* Sucks the juices from tender twigs, causing death of the new parts.

*Description:* A large brown bug about an inch long, with long sucking proboscis, with acute teeth at posterior corners of thorax. Greatly resembles *Leptoglossus.* The immature stages are soft and marked with yellow.

*Distribution:* Australia.


*Stigmodera heros* Gehin.

*(She-Oak Root Borer. Buprestidae; Coleoptera.)*

*Hosts:* She-oak and Bull-oak (*Casuarina*); also *Eucalyptus.* Adults frequent flowers of *Melaleuca,* etc.

*Injury:* Tunnels in the lower portions of the trunk of trees.

*Description and biology:* Beetles large yellowish brown with dark blackish legs. Larvae large yellowish white with powerful jaws. The eggs are laid in areas cleared by the female in the butts of the trees. The larvae bore in and down through the wood for several feet.

*Distribution:* Australia.


*Phoracantha tricuspis* Newman; *Phoracantha recurva* Newman.

*(Yellow-box Borers. Cerambycidæ; Coleoptera.)*

*Hosts:* *Eucalyptus viminalis.*

*Injury:* Very destructive borers.

*Description:* Beetles light brown with darker markings on the elytra. The head and thorax are very dark brown. *Pupa* yellowish white. *Larvae* bore in the wood. *Eggs* are deposited in crevices in the bark.

*Distribution:* Victoria.

French, C. *Handbook of Destructive Insects of Victoria,* pt. 5, 1911, pp. 70-73, pl. 112.

*Distichocera macleayi* Newman.

*(Feathery-horned Yellow-box Borer. Cerambycidæ; Coleoptera.)*

*Hosts:* *Eucalyptus stuartiana, E. viminalis.*

*Injury:* Bores in the wood.

*Description:* Female beetle reddish brown in color, larger than the male, which is black with beautiful featherlike antennae. *Pupa* yellowish white. *Larva* dull yellowish white, unusually tapering at apex. The adults frequently the flowers of the *Leptospermum* bushes.

*Distribution:* Australia.

Tryphocharla masteri Pascoe.
(Masters’ Gum Borer. Cerambycidae. Coleoptera.)

Hosts: Eucalyptus amygdalina, E. globulus.

Injury: Bores in the wood, the larvae taking several years for development.

Description: Adult over an inch long, with long antennae, brown, with broad yellow elytral band; thorax laterally dentate. Pupa elongate white. Larva cylindrical yellowish, with small head and broader prothorax, chitinous.

Distribution: Australia.


Bimla femoralis Saunders.
(Apple-gum Borer. Cerambycidae; Coleoptera.)

Host: Eucalyptus stuartiana.

Injury: Bores in the trunk, causing much damage. A severe scar appears on the surface of the bark where the burrow commences.

Description: The sexes are different in appearance, the male having antennae much larger than the body; the female antennae considerably shorter than the body. Elytra with yellow band at base, remainder of elytra brown. Head, thorax and tip of abdomen yellow in female; head and center of prothorax brown in male. Larva of female much broader, less attenuate, and with larger prothorax than in adult female.

Distribution: Australia.

French, C. Handbook of Destructive Insects of Victoria, pt. 4, 1909, pp. 110-113, pl. 78.

Strongylorhinus ochraceus Schaum.
(Red Gum-tree Weevil. Curculionidae; Coleoptera.)

Host: Eucalyptus melliodora.

Injury: Larvae bore in twigs causing gall-like deformation. Very injurious.

Description: A reddish-brown weevil about 12 mm. long with short, stout beak. Larva curved, legless, white, makes a cone shaped burrow in the wood.

Distribution: Australia.

French, C. Handbook of Injurious Insects of Victoria, pt. 4, 1909, pp. 128-130, pl. 82.

B. OTHER IMPORTANT EUCALYPTUS INSECTS.

HEMIPTERA.

Coccids:

Armored—

Aspidiotus (Aonidiella) miniatæ Green; Australia; Eucalyptus miniata.
Aspidiotus alatus Froggatt; Australia; Eucalyptus rostrata.
Aspidiotus confusus Froggatt; Australia.
Aspidiotus tasmaniae Green; Australia.
Chionaspis frenchi Green; Australia.
Lecaniodiaspis convexus Froggatt; Australia.
Lecaniodiaspis frenchi Froggatt; Australia.
Lecaniodiaspis newmanni Froggatt; Australia.

Unarmored—

Apliomorpha attenuata Froggatt; Australia.
Apliomorpha bauerei Froggatt; Australia
Apliomorpha calycina Tepper; South Australia; Eucalyptus dumosa, E. oleosa.
Apliomorpha conica Froggatt; Australia; Eucalyptus viminalis, E. uncinata.
Apliomorpha duplex Schrader; Australia.
Apliomorpha ellipsoidalis Tepper; Australia.
Apliomorpha floralis Froggatt; Australia.
Apliomorpha helmali Fuller; Australia.
Apliomorpha karschi Rübsaamen; Australia.
Apliomorpha maliformis Fuller; Australia; Eucalyptus patens.
Apliomorpha minor Fuller; New South Wales; Eucalyptus paustoma.
Cocidae—Continued.

Unarmored—Continued.

*Apiomorpha munita* Schrader; Australia; Eucalyptus robusta, *E. siderophloia*.

*Apiomorpha ovicola* Schrader; Australia; Eucalyptus kamstoma, *E. gracilis*, *E. leucoxylon*, *E. rostrata*.

*Apiomorpha ovicoleides* Tepper; Australia; Eucalyptus incrassata.

*Apiomorpha podunuculata* Fuller; Australia.

*Apiomorpha phaetretata* Schrader; New South Wales; Eucalyptus sieberiana, *E. corymbosa*, *E. capitellata*.

*Apiomorpha pileata* Schrader; New South Wales.

*Apiomorpha poriformis* Froggatt; Australia; Eucalyptus rostrata.

*Apiomorpha rugosa* Froggatt; Australia.

*Apiomorpha sessilis* Froggatt; Australia.

*Apiomorpha sloanei* Froggatt; Australia.

*Apiomorpha strombylosa* Tepper; Australia; Eucalyptus incrassata.

*Apiomorpha thorttoni* Froggatt; Australia.

*Apiomorpha unicolorata* Froggatt; Australia.

*Apiomorpha uralis* Tepper; New South Wales; Eucalyptus uncinata, *E. gracilis*, *E. melliodora*, *E. polyanthemos*.

*Apiomorpha variabilis* Froggatt; Australia; Eucalyptus piperita.

*Ascelis attenuata* Froggatt; Australia; Eucalyptus piperita.

*Asce.is echiniformis* Fuller; West Australia; Eucalyptus tessellaris.

*Asce.is praeолiis* Schrader; Australia; Eucalyptus corymbosa.

*Asce.is schraderi* Froggatt; Australia; Eucalyptus corymbosa.

*Ceromene caudata* Froggatt; Australia; Eucalyptus robusta.

*Ocnochiton eucalypti* Maskell; Australia; Eucalyptus siderophloia.

*Eriococcus confusus* Maskell; Australia; Eucalyptus viminalis.

*Eriococcus corylaceus* Maskell; Australia.

*Eriococcus eucalypti* Maskell; Australia, Tasmania; Eucalyptus diversicolor.

*Eriococcus simplicex* Maskell; Australia.

*Eriococcus ertri Froggatt; Australia; Eucalyptus piperita.

*Eriococcusgregarius* Froggatt; Australia, New Zealand.

*Eriococcus irregularis* Froggatt; Australia; Eucalyptus piperita.

*Eriococcus serratoloba* Green; Australia; Eucalyptus gracilis.

*Eriococcus pica* Froggatt; Australia.

*Eriococcus tesselatus* Froggatt; Australia.

*Eriococcus spiniger* Maskell; Australia.

*Eriococcus tepperi* Maskell; Australia, Tasmania; Eucalyptus globulus.

*Opisthosecis conico* Fuller; Australia.

*Opisthosecis fibularis* Froggatt; Australia.

*Opisthosecis globosa* Rühssamen; New South Wales; Eucalyptus capitellata.

*Opisthosecis maculata* Froggatt; New South Wales; Eucalyptus gracilis, *E. leucoxylon*.

*Opisthosecis mammularis* Froggatt; Australia.

*Opisthosecis maskelli* Froggatt; Australia.

*Opisthosecis nigra* Froggatt; Australia.

*Opisthosecis pisiformis* Froggatt; New South Wales, Australia; Eucalyptus melliodora, *E. robusta*, *E. resinifera*, *E. piperita*.

*Opisthosecis serrata* Froggatt; Australia.

*Opisthosecis spinos*a Froggatt; Australia; Eucalyptus siderophloia.

*Opisthosecis subrotunda* Schrader; Australia; Eucalyptus capitellata.

*Opisthosecis verrucula* Froggatt; Australia.

*Pseudococcus lobulatus* Maskell; Australia; Eucalyptus globulus.

ISOPTERA.

Termiteidae.

*Termes australis* Hagen; Australia. (See Apple.)

LEPIDOPTERA.

Acleridae.

*Nola metallopa* and *Spilosoma fuscinula*; Australia; attacks the foliage.

*Termesia nicosa*; Australia; larvae found under the bark in August.

Bombycidae.

*Ocinara leucini* Lewin; Australia; attacks foliage.

Geometridae.

*Cryptisphora occulta* and *Gastrophora henricaria*; Australia; defoliator.

*Mnesampela privata* Gn.; Australia; defoliator.
Lasiocampidae.
*Odonestis australasiae* Fabricius; Australia; defoliator.

Lymantridae.
*Tera contraria* Walker; and *Tricheta marginalis*, Australia; defoliators.

Hepliidæ.
*Choragia lignivora* Lewin; Australia. (See Apple.)

**DIPTERA.**

Itonidæ (*Cecidomyiidae*).
*Diptosis eucalypti* Skuse, *D. paralis* Skuse, and *Lasioptera miscella* Skuse; Australia; breed in twigs.

**LITERATURE.**

Froggatt, W. W. Australian Insects.

**EUGENIA** spp.

(Family Myrtaceae.)

Fruit-bearing trees of South America, etc., cultivated in the Southern States and California.

**DIPTERA.**

Trypetidæ.
*Anastrepha fraterculus* Wiedemann. (See Fruit.)
*Ceratitis capitata* Wiedemann, attacks *Eugenia brasiliensis, E. jambos, E. malaccensis, E. uniflora.* (See Fruit.)
*Dasis ferrugineus* Fabricius; India, etc., attacks fruit of *Eugenia malaccensis.* (See Fruit.)

**FIG; ASSAM RUBBER; BANYAN.**

(*Ficus* spp. Family Urticaceae.)

This is a very large genus of valuable plants, including the fig (*Ficus carica*), the India or Assam rubber plant (*F. elastica*), and the banyan (*F. benghalensis*). Many varieties of the fig are prized for their fruit. The India rubber of commerce is derived from *F. elastica*. Other varieties are popular in conservatories.

A. **BETTER KNOWN FIG INSECTS LIKELY TO BE IMPORTED.**

**Sinoxylon sudanicum** Lesne.

(Fig stem-boring beetle. *Bostrychidae*; Coleoptera.)

**Host:** Fig.

**Injury:** Bores in the twigs of young trees.

**Description and biology:** Adult beetle, brown with basal half of elytra tinged with yellow, about one-quarter inch long. The apex of the elytra is concave bituberculate. The adult bores in twigs near the buds and girdles the twig under the bark, laying its eggs in the outer portion which soon falls to the ground. The species is especially dangerous to nursery stock just planted, as it does not usually attack strong healthy trees.

**Distribution:** Sudan.


**Colobogaster quadridentata** Fabricius.

(Family Buprestidæ; Coleoptera.)

**Host:** Cultivated fig (*Ficus carica*).

**Injury:** Injury occasioned by galleries made by larvae in trunk and twigs. Liable to be introduced in cuttings or plants.
**PIG INSECTS.**

*Description and biology:* Adult beetle 25–30 mm. long, 11–12 mm. broad; blue black, with small points of metallic green. Practically entire life spent in plant.

*Distribution:* Brazil.

**BONDAR, GREGORIO:** Os insetos damninhos no Agricultura, 1913, p. 4.

*Batocera bolsduvali* Hope.

(Fig-tree borer. Family Cerambycidae; Coleoptera.)

*Hosts:* *Ficus macrophylla, F. australis.*

*Injury:* Bores in stems and branches of damaged and freshly fallen trees.

*Adult:* A beautiful grayish-green beetle, about 2 inches long, with a row of white marks on the elytra; very strong, heavy antennae; prothorax laterally armed with very strong spine on each side. Pupa light brown. Larva about 3 inches long, very robust, head black.

*Distribution:* Queensland.

**FRENCH, C.** Handbook of Destructive Insects of Victoria, 1911, pt. 5, pp. 134–137 pl. 126.

*Tenoletes scalaris* Fabricius.

(Family Cerambycidae; Coleoptera.)

*Host:* Cultivated fig (*Ficus carica*).

*Injury:* Injury due to galleries made by larvae.

*Description and biology:* Adult beetle 15–30 mm. in length; general color obscurest nearly black, with spots and streaks of yellow; triangular spot between the eyes, and behind the eyes is situated a half-moon-like spot. Practically entire life is spent, in the plant.

*Distribution:* Brazil.

**BONDAR, GREGORIO:** Os insetos damninhos no Agricultura, 1913, p. 9, figure.

*Hellipus bonelli* Boheman.

(Brazil Fig Borer. Curculionidae; Coleoptera.)

*Host:* Cultivated fig (*Ficus carica*).

*Injury:* Larvae make galleries in trunks and branches of fig. Liable to be introduced on plants or cuttings.

*Description and biology:* Adult weevil 12 mm. long, with characteristic designs on thorax and elytra, color light coffee brown, with symmetrical yellow spots. Larvae and pupae white. Practically the whole life cycle is spent in the tree.

*Distribution:* Brazil.

**BONDAR, GREGORIO.** Os insetos damninhos no Agricultura, 1913, p. 11. Figures injury, larva, pupa, and adult.

*Hylesinus porcatus* Chapuis.

(The Fig-Branch Borer. Scolytidae; Coleoptera.)

*Host:* Fig.

*Injury:* Occasioned by tunneling of insect. Liable to be imported in cuttings or plants.

*Description and biology:* Adult beetle short, thickset, rounded, general color black, varying to reddish brown in immature specimens; head and thorax slightly rugose and lightly covered with fine hairs. Breeds in galleries in twigs, entering just above a bud. (See plate xx.)

*Distribution:* New South Wales.

**B. OTHER IMPORTANT FICUS INSECTS.**

**HEMIPTERA.**

**Coccids:**

**Armored—**

**Aspidiotus** (*Aonidiella*) planchoniioides Green; Ceylon (Botanic Gardens).

**Aspidiotus** (*Aonidiella*) cocophilus Marlatt; Cuba.

**Aspidiotus** (*Aonidiella*) subcuticularius Green; Australia; *Ficus orbicularis*.

**Aspidiotus** (*Chromomphalus*) *personatus* Comstock; West Indies; Mexico; British Guiana; England (in greenhouses).

**Aspidiotus** (*Diaspidiotus*) africanus Marlatt; South Africa.

**Aspidiotus** (*Morganella*) maskelli Cockerell; Bermuda.

**Aspidiotus** (*Pseudomona*da) *articulatus* Morgan; Jamaica.

**Aspidiotus** (*Pseudomona*da) *claviper* Cockerell; Honolulu.

**Aspidiotus** (*Pseudomona*da) *silvatica* Lindinger; German East Africa, Kamerun; *Ficus indica*.

**Aspidiotus** (*Pseudomona*da) *trilobiformis* Green; East India, Ceylon, Mauritius, Japan, Brazil; *Ficus scandens* (see text fig. 32.)

**Aspidiotus** (*Pseudomona*da) *obita* Cockerell and Robinson; Philippines; *Ficus caudatifolia*.

**Schizaspis lobata** Cockerell and Robinson; *Ficus nota*.

**Chionaspis mammis** Green; India.

**Unarmored—**

**Aonidiella** (see text fig. 32.)

**Aspidiotus** (in Montserrat; F. Jamaica).

**Ficus longifolii** — *F. aegyptiaca* — *F. benghalensis*, *F. carica*.

**Hemichionaspis** *feci* Green; Bengal; *Ficus glomerata*, *F. carica*.

**Hemichionaspis** *minima* Green; India.

**Lepidosaphes** *felsifoli* Berlese; Algeria, Italy; *Ficus carica*.

**Lepidosaphes** *mexicana* Cockerell; Mexico.

**Lepidosaphes** *minima* Newstead; Algeria; *Ficus carica*.

**Conchaspis angraec** Cockerell; established in Florida, and has doubtless been imported from Mexico and Jamaica on numerous occasions. Scale of female approximately circular, conical, apex bluntly pointed, radiating from apex are six to eight strong ridges or carinae.

**Discaspis bromeliae** (Kern); Mexico.

**Hemichionaspis** *feci* Green; Bengal; *Ficus glomerata*, *F. carica*.

**Hemichionaspis** *minima* Green; India.

**Lepidosaphes** *felsifoli* Berlese; Algeria, Italy; *Ficus carica*.

**Lepidosaphes** *mexicana* Cockerell; Mexico.

**Lepidosaphes** *minima* Newstead; Algeria; *Ficus carica*.

**Unarmored—**

**Aonidiella** (see text fig. 32.)

**Aspidiotus** (in Montserrat; F. Jamaica).

**Ficus longifolii** — *F. aegyptiaca* — *F. benghalensis*, *F. carica*.

**Hemichionaspis** *feci* Green; Bengal; *Ficus glomerata*, *F. carica*.

**Hemichionaspis** *minima* Green; India.

**Lepidosaphes** *felsifoli* Berlese; Algeria, Italy; *Ficus carica*.

**Lepidosaphes** *mexicana* Cockerell; Mexico.

**Lepidosaphes** *minima* Newstead; Algeria; *Ficus carica*.

**Unarmored—**

**Aonidiella** (see text fig. 32.)

**Aspidiotus** (in Montserrat; F. Jamaica).

**Ficus longifolii** — *F. aegyptiaca* — *F. benghalensis*, *F. carica*.

**Hemichionaspis** *feci* Green; Bengal; *Ficus glomerata*, *F. carica*.

**Hemichionaspis** *minima* Green; India.

**Lepidosaphes** *felsifoli* Berlese; Algeria, Italy; *Ficus carica*.

**Lepidosaphes** *mexicana* Cockerell; Mexico.

**Lepidosaphes** *minima* Newstead; Algeria; *Ficus carica*.

**Unarmored—**

**Aonidiella** (see text fig. 32.)

**Aspidiotus** (in Montserrat; F. Jamaica).

**Ficus longifolii** — *F. aegyptiaca* — *F. benghalensis*, *F. carica*.

**Hemichionaspis** *feci* Green; Bengal; *Ficus glomerata*, *F. carica*.

**Hemichionaspis** *minima* Green; India.

**Lepidosaphes** *felsifoli* Berlese; Algeria, Italy; *Ficus carica*.

**Lepidosaphes** *mexicana* Cockerell; Mexico.

**Lepidosaphes** *minima* Newstead; Algeria; *Ficus carica*.
Coccidae—Continued.
Unarmored—Continued.
Tachardia fusi Green; India; Ficus religiosa.
Vinsonia stellaris Walker; British Guiana; Ficus altissima. (See Coffee.)

Pentatomidae.
Pteleophora pedicillata Kirby; Australia. (See Plum.)

COLEOPTERA.

Buprestidae.
Lampra assimensis Stebbing; India; on Ficus elastica.

Chrysomelidae.
Crioceris impressa Fabricius; India; feeds on foliage of Ficus elastica.
Podonaiia hyalina Linnaeus; India; a defoliating leaf beetle on Ficus elastica.

Cerambycidae.
Xanthoderma regularis Gahan; India; bores between the bark and sapwood of Ficus elastica.
Xylotrechus gahani Stebbing; India; bores in the branches of Ficus elastica.
Botocera rubra Linnaeus; India; bores in the trunk of fig trees (Ficus carica), causing much injury.
(See pl. XXI.)
Botocera albofasciata DeGeer; India, Java, Kamerun; an important borer in Ficus elastica.
Botocera frenchi; Australia; bores in native fig trees.
Olenecus bicuspidatus Fabricius; India; bores in Ficus rumphii, F. glomerata, and F. roxburghii.
Phryma spinator Fabricius; East Africa; bores in Ficus elastica.
Phryma conradi Kolbe, East Africa; bores in Ficus elastica.
Petrognatha gigas Fabriicis var. spinosa; West and East Africa; attacks Ficus spp.
Rosenbergia megacephala; Australia; bores in fig trees.

Curculionidae.
Curculio armatus Fabricius (Balaninus); Australia; breeds in the fruit of Ficus rubiginosa.
Alcides sceniatus Faust; India; in Ficus elastica.

Scolytidae.
Diamerus fici Blandford; India; attacks nursery stock of Ficus elastica.
Hypoboryus ficus Ericsson; Europe; galleries in bark of figs.

DIPETERA.

Trypetidae.
Ceratitus capitata Wiedemann; attacks fruit of Ficus carica. (See Fruit.)

LEPIDOPTERA.

Bombycidae.
Gunda siikima; India; attacks foliage of Ficus elastica.
Ocinara dilictula Walker and O. signifera Walker; Java; attack foliage of Ficus bergmanniana and F. elastica.

LITERATURE.

STEBBING, E. F. Indian Forest Insects, Coleoptera, 1914.

FIR.

(Picea spp., Abies spp. Family Pinaceae.)

Tall, pyramidal, evergreen trees growing in the northern and mountainous regions of the northern hemisphere. The wood is soft and perishable, but valuable products, such as balsam, are obtained from the exudations. For convenience the insect pests are arranged under Conifers.

FLAX.

(Linum usitatissimum. Family Linaceae.)

A plant of Europe and America cultivated for its oil-bearing seed and fibrous stem.
Phalonia epllinana Zell. (Conchylia.)
(Flax Capsule Worm. Family Tortricidae; Lepidoptera.)

Hosts: Flax (Linum), Solidago, etc.
Injury: Eats out the green capsules of flax.
Description and biology: Moth with forewings clay yellow with darker band and margin. Larva whitish yellow, sparsely pubescent, head and thoracic shield blackish; 6.5 mm. long. Pupates in the larval burrow.
Distribution: South Russia.


FORESTS.

BETTER KNOWN GENERAL DEFOILIATORS.

Under this heading are grouped a number of important insects known as forest defoliators. Several of these have been imported into the United States.

---

Fig. 54.—Cockchafer (Melolontha vulgaris); Adult—pupa, larva and its attack on root crop. (Lorenz.)

Melolontha vulgaris Linn.
(Cockchafer. Family Scarabaeidae; Coleoptera.)

Hosts: Adults feed on leaves of various trees; grubs on roots.
Injury: Often serious.
Description and biology: Adult, length often 25 mm.; head and thorax black; elytra brown, each with four raised, longitudinal lines; hairy; sides of body with alternate black and white patches; occurs in May and June. Pupa pale brown. This stage is passed deep in ground. Larva, length 37 mm., white, fleshy; caudal end swollen; head and legs brown. This stage lasts three years. Eggs, large, shape of hemp seed, creamy white (see text fig. 54).
Distribution: Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 431.
A Fig Borer.

Fig-borer (*Hylesinus porcatus*): Adult and injury  (Froggatt.)
Hibernia defoliaria Clerck.
(Mottled Umber Moth. Geometridae; Lepidoptera.)

Hosts: Apple and other fruits; forest trees.

Injury: Great damage done occasionally by defoliation; sometimes attacks fruit

Description and biology: Adult male, wing expanse 44 mm.; forewings normally pale dull yellowish, mottled with yellowish brown and dusted with brown; hind wings more uniform yellowish gray, with minute darker specks and a dark spot on each (color variable; many melanistic forms); female, wingless, plump, of various shades of yellowish gray and speckled with dark brown or black. Appears from October to February (England). Pupates in soil. Larva length 37 mm.; chestnut brown above; sides pale creamy yellow to bright yellow; venter pale yellow; spiracles pale with dark rims. Eggs deposited on buds and twigs, in dark crevices and on pruned surfaces, hatching in April. (See text fig. 57.)

Distribution: Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 58.

Malacosoma neustria Linnaeus.
(Lackey Moth. Lasiocampidae; Lepidoptera.)

Hosts: Fruit trees, oak, elm, hawthorn, rose, poplar, hornbeam.

Injury: Strips trees of foliage.

Description and biology: Adult male, wing expanse 25 mm., female 30-35 mm. Front wings reddish brown, ochreous or brick red with two transverse lines, pale or dusky; hind wings paler than front wings. Moth flies in July and August. (England.) Cocoon pale white or yellow, loose, of silk mixed with hairs. Pupa dark brown, stage lasting 2 or 3 weeks. Larva about 37 mm. long, bluish-gray in color with a pure white dorsal stripe; three orange red stripes along each side and between the two lowest of these a broad blue stripe with little black specks on it. These lines are separated by black, and black spotted with blue; a narrow dark line is on each side of the dorsal white stripe and two black spots on head and on first thoracic segment. The whole larva bears rusty hairs. Larvae feed under tents in early stages; later they retire to tents only at nights and during dull weather. Eggs are deposited in rings containing from 40 to 200 each, around twigs, and hatch about end of April. (See text fig. 58.)
Different Stages of the Brown-Tail Moth (Euproctis chrysorrhoea).

Winter nest at upper left; male and female adults, lower right; cocoon in leaves, upper right; male and female chrysalides above, male at left; full grown larva in center, somewhat reduced; young larva at its left; egg mass removed from leaf, showing single eggs at lower left; female ovipositing on leaf; egg mass also on same leaf. (Howard and Fiske.)
**Distribution:** Europe, except polar region; present also in western Asia, Siberia, China, and Japan.


**Montilhot, L.** *Les Insectes Nuisibles*, 1891, p. 22.


---

**Dasychira pudibunda** Linnaeus.

*(Redtail Moth. *Lymantriidae; Lepidoptera.)*

**Hosts:** Beech, hornbeam, oak, alder, buckthorn, hawthorn, blackthorn, hazel, rose, birch, elm, linden, maple.

**Injury:** General defoliator.

**Description and biology:** Moth wing expanse 33–60 mm.; female larger than male; forewings whitish-gray, with two dark cross lines and dark flecked fringe; hind wings dirty gray with washed-out bar; body reddish white or grayish in front, whiter behind. *Larva* 40–45 mm long. greenish yellow with black cross bars; yellow brushes on fourth to seventh segments; eleventh segment with a red hair pencil. Larvae feed on foliage June to October. Pupate on ground or in brush. *Pupa* brownish black, abdomen reddish brown, clothed with yellow hairs, in silken cocoon. Hibernates as pupa.

**Eggs** in clusters of 50 or more on twigs.

**Distribution:** Europe, China, Japan.


**Hess, Richard.** *Der Forstschutz*, vol. 2, 1900, p. 91–97, fig. 57.

**Guénault, G.** *Entomologie et Parasitologie Agricoles*, 1904, p. 392.


---

**Euproctis chrysorrhoea** Linnaeus.

*(Brown-tail Moth. *Lymantriidae; Lepidoptera.)*

**Hosts:** Beech, elm, hornbeam, maple, oak, poplar, blackthorn, hawthorn, rose, willow.

**Injury:** General defoliator; very serious.

**Description and injury:** Moth, white, posterior part of body reddish brown; wing expanse 30–50 mm. *Larvae* 30–38 mm long, brownish gray, with light brown hairs. The larvae feed on foliage under heavy white webs. (See plate xxii.)

**Distribution:** Palaearctic regions (Europe, Asia). Has been introduced into the northeastern United States.

---

**Annual Reports State Forester of Massachusetts.**

---

**Euproctis dispar** Linnaeus (*Lymantria*).

*(Gipsy Moth. *Lymantriidae; Lepidoptera.)*

**Hosts:** Beech, elm, hornbeam, linden, maple, oak, poplar, willow, alder, birch.

**Injury:** General defoliator. Easily transported in egg stage on bark of nursery stock. A very serious pest.

**Description and biology:** Male, moth 35–50 mm.; forewings gray brown with dark brown, strongly notched transverse stripes and dark flecks on fringe; hind wings brown, with dark border and light fringe. **Female**, moth 37–62 mm., wings white with dark fringe spots; the dark transverse stripes in outer part of forewings often disappearing. *Larva* with large head; brown, hairy; three fine yellow longitudinal lines; the first five segments with two blue warts each and on the remaining segments two red warts each; length 7 cm. (See Frontispiece.)

**Distribution:** Europe, Asia, New England States.


Lymantria monacha Linneus.

Hosts: Beech, birch, elm, poplar, oak, maple, linden, hazel, willow, pine, spruce, mountain ash, buckthorn, bunch cherry, hornbeam, larch, white spruce.

Injury: Attacks the foliage of many trees and is sometimes very serious. As the eggs are said to be laid under the bark, it is very likely to be shipped in nursery stock.

Description and biology: Moth, with forewings white, with strong notched black lines; hind wings grayish white; fringe flecked with black; abdomen reddish with black bands. Larvae brown with six blue and red warts on dorsum; on second segment a black, blue, and white spot; three last segments' flecked with black; 4-5 cm. long. The species is quite variable in color. The larva is polyphagous, attacking foliage; the larvae are gregarious and feed within a web.


Porthesia similis Fussley.

Hosts: Beech, birch, elm, hornbeam, linden, mountain ash, maple, oak, willow, rose.

Injury: General defoliator. LIABLE to importation in the larval stage on the bark of nursery stock.

Description and biology: Moth, white with a few black spots on inner margin of forewing; abdomen clad with golden yellow hairs. Larva black, clothed with grayish-black hairs. The larvae feed singly on foliage and hibernate singly under bark, etc. The eggs are laid in a mass on undersides of leaves and covered with yellow hairs from the moth. Pupation occurs in a thin white silken cocoon.


Phaleria bucephala Linneus.

Hosts: Deciduous fruits; cobs, filberts, nuts, birch, beech, elm, rose, poplar, willow, linden, oak, alder.

Injury: Defoliates plants when abundant.

Description and biology: Adult, wing expanse 62-70 mm.; forewings ash gray with a transverse streak of reddish brown near base and another of dark brown near apex of wing, marked at tip with a large pale buff or ochreous lunular spot. Larva about 50 mm. long when grown; the ground color dark yellow, with a broad dark stripe down the back; along each side are three black lines interrupted with yellow or orange rings. Eggs very convex, flat beneath, pearly white, with a basal green band and dark spot on apex. The insect spends the winter as a pupa in the soil. moths appearing in spring, ovipositing on undersurface of twigs or on foliage.

Distribution: Europe, except Polar region, Siberia, etc.


FRUITS.

Better known general fruit-tree insects.

Under this heading are grouped a number of very important insects which attack many different kinds of fruits, especially the fruit flies.
**FRUIT INSECTS.**

**Aleurodicus cocois** Curtis.

*(Coconut White Fly. Aleyrodidae; Hemiptera.)*

**Host:** Coconut, banana, guava, "jicaco," *Coccoloba uvifera.*

**Injury:** Serious pest in many parts of tropical America.

**Description and biology:** Adult varying in size and wing markings, wings marked with two dusky patches; pupal case varies in size and is surrounded by a double row of bristlelike hairs usually 13 to a side, also has one pair of long caudal hairs. *Egg* about 0.29 mm. long and 0.11 mm. wide, with pedicle arising from side.

**Distribution:** Barbados, Trinidad, Venezuela, Brazil, Mexico, Isthmian Canal Zone, Yucatan.


**Nysius vinitor** Bergroth.

*(The Rutherglen Bug. Lygæidae; Hemiptera.)*

**Hosts:** Grapes, cherries, plums, peach, grasses, etc.

**Injury:** Stated to be one of the most destructive plant bugs in Australia.

**Description and biology:** Adult 4–5 mm. long; dull brown to gray in color, with silvery-gray wings; antenna barely two-thirds length of body and covered with hairs. Breeds in grass lands and swarms over field crops and fruit trees in countless millions.

**Distribution:** Australia. (See plate xxiii.)

**French, C.** Handbook of Destructive Insects of Victoria, 1891, pt. 1, p. 105.

**Froggatt, W. W.** Australian Insects, 1907, p. 334.

* **Hellothrips rubrocinctus** Giard.

*(The Red-Banded Thrips. Thysanoptera.)*

**Hosts:** Avocado (*Persea gratissima*), mango (*Mangifera indica*), cashew, guava (*Psidium guajava*), cacao (*Theobroma cacao*), Liberian coffee (*Coffee liberica*), wild guava (*Anacardium occidentale*), roses, Mexican almond or umbrella tree (*Terminalia catappa*), kola (*Sterculia acuminata*).

**Injury:** Larvae and adults feed on both surfaces of foliage. May be introduced on living plants.

**Description and biology:** Egg stage varies from 6 to 17 days, larval stage from 6 to 20 days. Adult female about 1.11 mm. long and quite stout, color dark brown or black. A red band is evident in the first and second larval stages, pupa and prepupa. (See pl. x.)

**Distribution:** Guadeloupe, French West Indies; Grenada, St. Vincent, St. Lucia, British West Indies; Trinidad, Tobago, Virgin Islands, Mauritius, Ceylon, Uganda. In addition to the above it is reported from Florida and was doubtless introduced.


**Phyllopertha horticola** Linnaeus.

*(Scarabæidae; Coleoptera.)*

**Hosts:** Fruit trees and herbaceous plants.

**Injury:** Destroys foliage and roots.

**Description and biology:** Adult length 8–11 mm.; body depressed, hairy; head and prothorax shining green; elytra golden brown or chestnut; ventral parts black. Appears in May and June (Italy). Feeds on leaves. The *larva* is a root feeder. Silvestri states that the adults and larvae of this insect feed on leaves and roots of fruit trees and herbaceous plants.

**Distribution:** Europe.

**Silvestri, F.** Dispense di Entomologice Agraria, 1911, p. 311.
Capnodis tenebrionis Linnaeus.
(Buprestidæ; Coleoptera.)

Hosts: Various fruit trees.
Injury: To leaves and roots.

Description and biology: Adult length 15–22 mm.; color opaque black, with prothorax sparsely dusted with cinereous; feeds on leaves. Larva elongate, whitish; covered with a fine pubescence; feeds in roots and trunk beneath cortex. Eggs deposited during August and September on crown of trees. (See text fig. 59.)

Distribution: Southern Europe.

Silvestri, F. Dispense di Entomologie Agraria, 1911, p. 335.

Phyllobius oblongus Linnaeus.

(Oblong Leaf Weevil. Brachyrhinidae; Coleoptera.)

Hosts: Fruit trees, bushes.
Injury: Frequent. Adults attack young buds and leaves. Larvae feed on roots of various plants.

Description and biology: Adult length 4–5 mm.; black; elytra covered with brown scales with reddish tinge or pale gray, borders dark; head, thorax, and elytra covered with gray pubescence; legs brown or yellowish. Occurs throughout May and June. Pupates in spring in earth. Larva a white footless grub, slightly hairy; head brown. Winters as larva. Eggs are deposited in ground.

Distribution: Europe.


Biston hirtarius Clerck.

(Cherry Spinner. Geometridæ; Lepidoptera.)

Hosts: Stone fruits, orchard trees.
Injury: Defoliation.

Description and biology: Adult in both sexes winged; whitish, dusted with blackish gray and obliquely marked with blackish brown. Occurs in March and April (Germany). Pupates in the earth. Larva, length 35 mm.; ash gray or brown in color. with longitudinal dark lines; prothorax, tubercles and two spots on each segment yellow; occurs from May until September. (See text fig. 60.)

Distribution: Germany, northern Europe.


Biston pomonarius Hübner.

(Geometridæ; Lepidoptera.)

Hosts: Fruit trees and oaks.
Injury: Defoliation.

Description and biology: Adult, male wings grayish white, on border blackish, dusted with gold, with dark oblique lines; female, with wing stumps black, sprinkled with
red and with gray and white hairs. Occurs in April and May (Germany). *Pupates in the earth.* Larva, length 40 mm.; gray, with golden, longitudinal lines; occurs May to July.

*Distribution:* Northern Europe.


**Hibernia rupicapraria** Hübner.

*(Early Moth. Geometridae; Lepidoptera.)*

**Hosts:** Plum, thorns, fruit trees.

**Injury:** "No record of serious damage." (Theobald.)

*Description and biology:* Adult male wing expanse 30 mm.; forewings gray brown, with broad dark area across middle, edges dark and notched; hind wings whitish gray, with a dark central spot above middle and crossed by an indistinct gray streak; female, almost wingless, stumps of wings grayish; occurs in January and February (England). Larva bluish green with pale green back, front of each segment darkened, and a white line on each side; pupates in soil.

*Distribution:* England, Europe (except Russia), Asia Minor.


**Gastropacha quercifolia** Linnaeus.

*(Lappet Moth. Lasiocampidae; Lepidoptera.)*

**Hosts:** Apple, plum, pear, hawthorn, blackthorn, willow, sallow.

**Injury:** Can not be looked upon as a pest. Sometimes strips branches and shoots.

*Description and biology:* Adult male wing expanse 56 mm.; female, 80 mm.; color rich brown, with dark irregular, transverse, scalloped lines on both pairs of wings, edges of wings scalloped. Moths appear in June and July (England). *Pupa* large brown motile; cocoon spun among twigs of trees, crevices, in bark and rubbish on ground; oval, pointed at one end and mouse-colored. Larva 100 mm. long; gray and gray brown, with faint V-shaped dark marks dorsally; two deep blue or purple bands
across first thoracic segment; above legs on each side is a row of fleshy pad-like appendages with long gray hairs like "lappets"; body finely hairy. Larvae appear in autumn and hibernate, extended on twigs.

**Distribution:** Europe.

**Theobald, F. V. Insect Pests of Fruits, 1909, p. 19.**

**Odeneis prunii** Linnaeus.

*(Lasiocampidæ; Lepidoptera.)*

**Hosts:** Various fruit trees.

**Injury:** Defoliation.

**Description and biology:** Adult length of wing 20–30 mm.; forewing orange, strongly dusted with red, with sharp points and a notched margin; a single white spot in the middle; front diagonal lines arched, hind diagonal line straight, body and hindwing brick red. Occurs June and July (Germany); pupates in May (Germany) in grayish-white cocoon. Larva length 65–70 mm.; blue gray, with golden longitudinal lines, and dull golden-gray spots; head brownish gray; hatches in August; overwinters and feeds in spring until May (Germany). Eggs deposited singly.

**Distribution:** Europe.

**Virachola insocrates** Fabricius.

*(The Amar Caterpillar. Lycæidæ; Lepidoptera.)*

**Hosts:** Pomegranate, guava, loquat, and wild fruit.

**Injury:** Larvae occasion considerable injury by feeding in the fruit.

**Biology:** Eggs deposited singly on flowers; caterpillar on hatching bores into the fruit, feeding on the hard seed; pupates over the base of fruit. (See text fig. 61.)

**Distribution:** India.

**Maxwell-LeRoy, H. Indian Insect Pests, 1906, p. 179.**

**Orgyia gonostigma** Fabricius.

*(Brush Spinner; Corner spot. Lymantriidæ; Lepidoptera.)*

**Hosts:** Orchard and other trees.

**Injury:** Defoliation.

**Description and biology:** Adult male, forewing 13–15 mm.; olive brown with white spots on the front and inner margins toward the base; long orange wavy lines, basal portion, and a spot on the oblique vein, purple brown, fringe between veins black spotted; hind wing brownish black. First generation June and July, second, September (Germany). Pupates between leaves and in crevices. Larva of male, 52 mm.
A Cherry Pest.
The Rutherglen bug (Nysius vinitor): Adults and injuries to cherries. (French.)
The Painted Apple Moth.

The painted apple moth (*Teia anartoides*): Adults, larvae, pupae, eggs. (French.)
The Queensland Fruit Fly.
The Queensland fruit fly (Bactrocera tryoni): Adults, larva, puparium. (Froggatt.)
WINGS OF FRUIT FLIES.

Fig. a.—Ceratitis striata. Fig. b.—Ceratitis capitata. Fig. c.—Ceratitis rubicora. (Froggatt.)
long, of female 30 mm.; black striped with reddish gold; four pair of dorsal brushes, golden brown; pencils black, adorned with long variable hairs; warts white covered with golden hair; head grayish black with red collar; spring and summer broods. Eggs deposited in mass near pupal exuvium; overwinter.

**Distribution:** Europe.

**Henschel, G. A. O.** Die Schädlichen Forst und Obstbaum-Insekten, 1895, p. 326.

**Tela anartoides** Walker.

*Hosts:* Fruits, particularly apple, cherry, rose, acacia. Almost omnivorous.

*Injury:* One of most injurious caterpillars of New South Wales. Eats upper surface of leaves. "Strips trees." (French.)

*Description and biology:* Adult female, short, rounded, wingless; male, wing expanse 25 mm.; fore wings dark brown marbled with slender lines and black spots; hind wings yellow surrounded with black outer margin; antennae featherlike. Two broods. *Pupa* in loose brown silken cocoon of flimsy character. Winters as pupa. *Larva,* 44 mm. long, brown, hairy, with tufts of hairs standing out at front and sides of head and stiff brushes of gray hairs along center of back. *Egg,* dull white, hemispherical. Females average 700 eggs, deposited in the cocoon. (See plate xxiv.)

*Distribution:* New South Wales, Victoria.

**French, C.** Handbook of Destructive Insects of Victoria, 1900, pt. 3, p. 94.

**Olethreutes cynobatella** Linnaeus.

*Host:* Various fruit trees.

*Injury:* Attacks leaf and blossom buds.

*Description and biology:* Adult, fore wing 7.5-10.5 mm.; from the middle of the front margin to the inner angle dark bluish-gray mixed with brown; behind the middle, two variable, distinct dark spots on an entirely white background; the large apical third white, clouded with gray. On wing, June until August (Germany). *Pupates* in grass or in crumpled leaves, drawn together, during May and June. *Larva,* brownish green; bores in the opening leaf and flower buds, the points of which it spins together; occurs in spring from time of swelling of buds until May (Germany). *Eggs* are deposited singly on buds; overwinter.

*Distribution:* Germany, Europe.


**Anastrepha fraterculus** Wiedemann (acidusa Walker).

*Fruit Fly.* Trypetidæ; Diptera.)

*Hosts:* Guava, (Psidium guajava), coffee berries, pear, peach, mango, orange, Eugenia spp., Phylocalyx, Japanese plum, Japanese persimmon, Para plum (Spondias spp.?), Annona humboldtiana, jobo amarillo, jobo de la India.

*Injury:* A very destructive species and likely to be introduced.

*Description and biology:* Adult fly, about 12 mm. in length (the female exclusive of the ovipositor), with a wing expanse slightly over 25 mm. Color of body rust-yellow or brownish yellow, with three sulphur-yellow longitudinal stripes on the thorax in well preserved mature specimens. Wings clear tinted in part with a characteristic pattern of yellow brown, the brown predominating on the basal half and extending obliquely forward, being continued along the anterior margin in a broad streak to the extreme tip of the wing; a clear sinuate basal zone involves the second basal cell, the base of the discal and part of the first basal cell, and is followed by a detached spot.
at the costa just beyond the tip of the first vein; on the discal half of the wing there is a brown band in the shape of an inverted V, resting on the posterior margin and extending through the first and second posterior cells; this V-shaped mark may be independent, or its apex may be joined to the other brown zone. There is considerable variation in the wing pattern, both as to intensity of coloring and detail of the pattern. Immature specimens have the brown wing pattern much weaker; newly emerged ones show hardly a trace of it. Female ovipositor stout, shorter than abdomen, tapered regularly toward tip and covered with coarse black hairs; in mature specimens it is subcylindrical, but in specimens not fully hardened it is flattened.

**Distribution:** Mexico, Central and South America, West Indies.


**Anastrepha ludens** Loew.

(Mexican Fruit Fly. Trypetidæ; Diptera.)

**Host:** Orange, sweet lime, mango, *Sideroxylon* (*Achras*) *spp.*; peach, guava, plum.

**Injury:** Considered a serious pest in Mexico. Quarantine issued January 15, 1913.

**Description and biology:** Adult female, length 9 mm.; of dull ochreous yellow color; wings hyaline, mottled and striped with brownish yellow bands; anal segment of abdomen longer than remainder of abdominal segments combined. Eggs deposited under skin of ripening fruit, larvae on hatching out tunnel into the fruit; pupate in soil. Average life cycle about 3 months, making about four generations a year in Mexico.

**Distribution:** Mexico.

**Froggatt, W. W.** Department of Agric., New South Wales, Farmers' Bull. 24, 1909, p. 53.

**Anastrepha peruviana** Townsend.

(Peruvian Fruit Fly. Trypetidæ; Diptera.)

**Hosts:** Peach, guava, cherimoya, many other deciduous and citrus fruits.

**Injury:** Very serious in Peru.

**Description:** Female fly, to tip of ovipositor, 7–8 mm. long; male 6.5–7 mm. long; wing expanse 6–6.5 mm. Color of head, pleure, anterior half of venter, and legs watery lemon yellow; antennae and proboscis buff yellow; tibiae and tarsi slightly dusky; mesopleural and sternopleural plates largely rufous-yellow tinged; eyes bright green to lilac purple; other parts obscure tawny or yellow.

**Distribution:** Peru.


**Bactrocera tryoni** Froggatt.

(Queensland Fruit Fly. Trypetidæ; Diptera.)

**Host:** Banana, mango, peach, apricot, nectarine, orange, apple, quince, black apple (*Siderozyylon* [*Achras*] *australe*), cheesewood (*Acronychia* *levis*), white ash (*Schizomeria* *ovata*), cucumbers, loquats.

**Description and biology:** Adult female, 6 mm. long with wing expanse 10–12 mm., wings transparent, abdomen constricted at the base and broadly rounded at the tip, thorax with a broad creamy often pale dorsal band running down the scutellum with short, well-defined narrow pale yellow stripe on each side. (See plate xxv.)

**Distribution:** India, Ceylon, Java, Amboina, Australia (Queensland, New South Wales).


**Froggatt, W. W.** Dept. of Agric. New South Wales, Farmers' Bul. 24, 1909, p. 11.
Ceratitis anonae Graham.

(Annona Fruit Fly. Tryptetide; Diptera.)

**Hosts:** Sour sop (*Annona muricata*), guava (*Psidium cattleianum*), and cacao pods.

**Injury:** Attacks fruit.

**Description:** Adult female, head alutaceous, wings with black spots at the base, abdomen nut brown in color on dorsum, antennae almost twice as long as wide; length of body 6 mm.


Ceratitis capitata Wiedemann.

(The Mediterranean Fruit Fly. Tryptetide; Diptera.)


**Injury:** Very injurious wherever it becomes established.

**Description and biology:** Egg deposited inside of fruit by female, and requires from 2 to 3 days to hatch; the larva upon hatching feeds on the pulp or inside of the fruit until full grown, requiring from 9 to 12 days, whereupon it leaves the fruit and enters the ground to puate, which stage ranges from 12 to 20 days. The period required for the various stages is influenced by the season, as indicated by Silvestri, requiring from 21 to 23 days to complete the life cycle in August and from 32 to 35 in October. At Honolulu adults have been kept alive for 10 months and certain individuals have required 90 days for development. (See pl. xxvi, fig. b.)

**Distribution:** Southern Europe (southern Italy, Sicily, Malta, France, Greece, Spain), *Azores*, Cape Verde Islands, Madeira, Africa (Egypt, Algeria, northern Uganda, Delagoa, Transvaal, Cape Colony, Kongo, Nigeria, Dahomey), Brazil, Argentina, Bermuda, Australia (West Australia, New South Wales, northern Victoria, and Queensland), northern New Zealand, Hawaiian Islands.

Ceratitis nigerrima Bezzi.

(Nigeria Fruit Fly. Trypetidæ; Diptera.)

Hosts: Coffee berries, fruit of wild plant (?), Eugenia uniflora.
Injury: Breeds in fruit.
Description: Adult female with black polished body, head umber, wings colored with brown, tibiae and tarsi dirty yellowish white, ovipositor slightly recurved.
Distribution: Southern Nigeria, Kamerun.


Ceratitis giffardi Bezzi.

(Giffard Fruit Fly. Trypetidæ; Diptera.)

Hosts: Chrysobalanus ellipticus, Sarccephalus esculentus.
Injury: Larvae feed in fruit of Sarccephalus and less so in Chrysobalanus.
Description and biology: Adult female, body ochraceous, thorax marked with black, wings with black lines and markings at base, bearing also yellowish and brown bands. Transformation to the pupa takes place in the soil, requiring from 10 to 12 days before emerging as adult.
Distribution: Senegal, Dahomey, southern Nigeria.


Ceratitis punctata Wiedemann.

(The Cacao Fruit Fly. Trypetidæ; Diptera.)

Hosts: Cacao-pods, mango, guava, passion fruit.
Injury: Breeds in fruit.
Biology: Eggs deposited under peel of ripening pods. Pupates in soil. Life cycle requires from 77 to 92 days for completion.
Distribution: Ashanti, West Africa and Uganda, East Africa.


Ceratitis rubivora Coquillett.

(Natal Fruit Fly. Trypetidæ; Diptera.)

Host: Various cultivated and wild fruits.
Injury: Considered one of the most important pests in Natal, infesting both native and cultivated fruits.
Description: Adult female 4-5 mm. long, head yellowish, thorax yellowish brown, abdomen yellowish, ovipositor flattened. Biology similar to that of C. capitata. (See plate xxvi, fig. c.)
Distribution: Natal, Cape Town, South Africa.


Ceratitis silvestri Bezzi.

(Fruit Fly. Trypetidæ; Diptera.)

Hosts: Chrysobalanus, Butyrospermum parkii.
Injury: Breeds in fruit.
Description and biology: Adult, body clay or leather color, face and occiput whitened, thorax with a few black markings. Biology similar to C. capitata.
Distribution: Senegal, French Sudan.

Dacus diversus Coquillett.

(Three-striped Fruit Fly. Trypetidae; Diptera.)

Host: Mango, orange, guava, peach.

Injury: Breeds in fruit.

Description: Adult, 4–5 mm. long; center of thorax marked with a pale yellow line, with darker regular coloration of the abdomen.

Distribution: Ceylon, India.


Dacus ferrugineus Fabricius.

(Mango Fruit Fly. Trypetidae; Diptera.)

Host: Fruit of mango (Manypsara indica), cucurbitaceous fruits?, ak (Calotropis sp.), citrus fruit, Eugenia malaccensis ("cabuyao").

Injury: Injurious to over-ripe fruit and commonest species in India and Ceylon.

Description and biology: Adult, medium size, measuring about 5 mm.; color rusty red, with dorsal surface of thorax varying from black to a rusty red; sometimes the abdomen is marked with almost black bands. Larvae when in fruit small, yellowish, with pointed head and truncate abdomen; pupate in the soil and emerge as adults in about nine days.

Distribution: India, Java, Ceylon, Amboina, Philippine Islands.

Cotes, E. C. Indian Museum Notes, 1896, p. 17.


Dacus fenchuli Froggatt.

(Fruit Fly. Trypetidae; Diptera.)

Host: Fruit of Artocarpus integrifolius.

Injury: Bred from oranges entering Victoria from New Caledonia.

Description: Adult, female about 10 mm. long, with long, rounded body: large hyaline wings with broad costal stripe of light reddish brown; head with large black spot on each side of face and below the base of the antennæ; thorax dull yellowish brown; legs yellow, with tarsi darkest.

Distribution: New Caledonia, Java.


Dacus passiforme Froggatt.

(The Fiji Fly. Trypetidae; Diptera.)

Host: Granadilla, mango, shaddock; the orange, lemon, and lime are slightly infested.

Injury: One of the most abundant fruit flies in Fiji.

Distribution: Fiji.


Dacus persicae Ris.

(Peach Fruit Fly. Trypetidae; Diptera.)

Hosts: Mango and peach.

Injury: Larvae injure ripe fruit.

Description and biology: Adult, red brown with black and yellow markings on the body. Eggs usually deposited in wound on skin of fruit; egg stage about 2 or 3 days;
larval stage 10 to 15 days inside fruit, after which it leaves the fruit and enters the ground to pupate; pupal stage about a week.

**Distribution:** Bhagalpur and Lower Bengal, India.

**Basu and Dutt.** Crop Pest Handbook for Behar and Orissa, including also Western Bengal, 1913, p. 74.

**Dacus psidii** Froggatt.

(South Sea Guava Fruit Fly.  Trypetidae; Diptera.)

**Host:** Guava, granadilla.

**Injury:** Larvae feed in fruits.

**Description:** Adult female, 6 mm. long, wing expanse 10 mm.; head light brown with rich metallic purple eyes, antennae brownish black, with last joint black; thorax black; abdomen black, elongate, and narrow at base.  (See plate xxvii, figs. 1a, 2a, a, 4a.)

**Distribution:** Fiji, New Caledonia.


**Dacus (Tephritidae) xanthodes** Brown.

(Brown's Fruit Fly.  Trypetidae; Diptera.)

**Host:** Pineapple, granadilla, guava, mammee apple, shaddock.

**Injury:** Breeds in fruits.

**Description:** Adult female, 9 mm. long, wing expanse 15 mm., general color pale ochreous yellow; thorax with faint yellow dorsal stripe, and pale yellowish white stripe margining each side and marking the sides of the scutellum; abdomen elongate and truncate at apex.

**Distribution:** Fiji.  (Bred in New Zealand from fruit imported from Fiji.)


**Riioa musae** Froggatt.

(The Island Fruit Fly.  Trypetidae; Diptera.)

**Host:** Banana, *Sideroxylon (Achras) australae* (black apple).

**Injury:** Larvae feed in bruised or blemished fruit.

**Description:** Adult female, 6 mm. long, wing expanse 12 mm., head small, ochreous, antennae yellow with long bristle at apex of second joint, thorax brownish yellow, abdomen small, light brown at base, black on apical half, and covered with coarse hairs.  (See plate xxviii, figs. 1, 2.)

**Distribution:** New Hebrides, Queensland, New South Wales.


**GOOSEBERRY; CURRANT.**

(Ribes spp.  Family Saxifragaceae.)

Shrubs bearing small edible fruits; native to Europe, Asia, North America, and South America.

**A. BETTER KNOWN GOOSEBERRY AND CURRANT INSECTS LIKELY TO BE IMPORTED.**

**Eriophyes ribis** Nalepa.

(Currant Gall Mite.  Eriophyidae; Acarina.)

**Host:** Infests especially the black currant (*Ribes nigrum*), but also *R. rubrum*, and *R. alpinum*.  Certain varieties of black currant are preferred, as Baldwin, Black Naples, Black Dutch, and Lee's Prolific.
Injury: Seriously injurious; can be introduced in nursery stock.

Description and biology: Microscopic. Adult about 230 microns long by 40 microns wide. Male smaller; color whitish or pale green, semitransparent and shiny. Sub-cylindrical in shape; 60-70 transverse rings furnished with regular series of short projections, best seen on sides. Infests the buds which may contain thousands of mites, causing them to swell, producing so-called "big buds." Such buds, if they open, usually fail to produce fruit of value. (See text fig. 62.)

Distribution: Middle Europe; England.


Bryobia ribis Thomas.

(Red Gooseberry Mite. Tetranychidae; Acarina.)

Hosts: Gooseberries and currants.

Injury: Very serious injury caused by sucking the juices of the plant. Very easy to introduce on nursery stock.

Fig. 62.—Currant gall mite (Eriophyes ribis): Mite and galls. (Sorauer.)

Description and biology: This is one of the minute red spiders, having eight legs, which breed on the foliage of plants, causing a rusty appearance. The eggs are spherical and microscopic in size.

Distribution: Germany, England.


Abraxas grossulariata Linnaeus.

(Magpie or Currant Moth. Geometridae; Lepidoptera.)

Host: Currant, gooseberry, and fruit trees.

Injury: Defoliation; seldom seriously injurious.

Description and biology: Adult wing expanse 37 mm. (variable); color creamy white, spotted with black, with orange yellow between black spots at base of forewings; hind wings like front, but with no yellow; thorax and abdomen yellow and black. On wing in July and August (England). Pupa black, with three golden yellow rings to the body. Cocoon delicate, attached to leaf or twig. Larva length 37 mm.;
color creamy white, spotted, and marked with black and orange yellow at sides. Appear in fall; winter as very small larvae, ready to pupate in June. Eggs, cream-colored, laid singly or in groups; hatch in from 6 to 15 days. (See text fig. 63.)

**Distribution:** England, Europe, Siberia, China.


**Thamnonoma wauaria** Linneus.

*(Currant Webworm. Geometridæ; Lepidoptera.)*

*Hosts:* Ribes spp.

*Injury:* Attacks leaves, buds, flowers, and often fruit.

*Description and biology:* Adult, wing expanse 25 mm.; front wing pure gray with brown and black crosslines; hind wing ashen gray dusted with black. Occurs June and July. *Pupates* in or on ground. *Larva,* length 25 mm.; blue green with darker, white bordered median line, and a yellow side stripe; on each segment a black tubercle bearing bristles. Shortly before pupation mostly violet or reddish brown.

**Distribution:** Northern Europe.


*Zophodia convolultella* Hübn. (Pyralidæ; Lepidoptera.)

*Hosts:* Gooseberry and currant.

*Injury:* To fruit and leaves.

*Description and biology:* Adult, wing expanse 30 mm.; forewing brownish gray with whitish and dark brown lines; occurs during end of April and beginning of May. (Germany.) *Pupa* overwinters in shallow earth. *Larva,* length 10 mm.; color grass green; head and thoracic shield black; occurs from May until July; draws berries and adjoining leaves together by a web; feeds on fruit. Egg deposited singly on twigs (see text fig. 64).

**Distribution:** Europe.

The Mandarin fruit fly (*Dacus ornatusimus*) and wing.

The banana fruit fly (*Dacus curtipennis*) and wing. (Froggatt.)
Injurious Grain Insects.

Figs. a, b.—Haplothrips aculeata; c, Limothrips denticornis; d, Haplothrips tritici; e, g, Oria musculosa; f, h, Trachea basilinea; i, n, Hylemyia coeretata; k, Isosoma noxiale; l, m, Trachelus tabidos. (Kurdjumov.)
Incurvaria capitella Clerck.

(Currant Shoot Borer. Tineidae; Lepidoptera.)

*Hosts:* Currants; especially red currants.

*Injury:* Seldom serious; tunnels the shoots.

*Description and biology:* Adult, wing expanse ½ inch. Forewings dark brown with purplish iridescence; near base a transverse yellow band and two yellow spots near tip; head deep yellow. Occurs from mid May into June. *Pupa,* brown, in loose cocoons in tunneled shoots. *Larva,* dull greenish, with red patch on ninth segment; head and first thoracic segment black. Hatch in summer, feed on seeds in fruit, then spin hibernaculum on bark; attack buds and shoots in spring causing the tips to wilt; mature in April and May. *Eggs* are colorless, lemon-shaped, 0.67 mm. long.

*Distribution:* Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 213.

Notocella roborana Treitschke.

(Currant Fruit Moth. Tortricidae; Lepidoptera.)

*Host:* Currant, rose, *Rubus* sp., whitethorn, oak.

*Injury:* Hollows out ripening currants.

*Description and biology:* Adult, forewing white, mixed with dull gray before the border; rusty red at point; base gray brown; speculum dotted black; palpi reddish brown. On wing June and July (Germany). *Pupae* in currant leaves and the stage lasts 3 weeks. *Larva,* length 17 mm.; plump, brown, head yellowish brown, neck and anal shield black; on each segment a brown wart, each with a light bristle; webs up leaves and fruit; occurs in early spring.

*Distribution:* Europe.


Theobald, F. V. Insect Pests of Fruit, 1909, p. 212.


B. OTHER IMPORTANT CURRANT AND GOOSEBERRY INSECTS.

Hemiptera.

Cocidae:

*Armored—*

*Chionaspis salicis* Linnaeus; Europe; *Ribes sanguineum.*

*Epidiaspis piricola* Del Guercio; Italy, France, Portugal, Germany, England.

*Florinia grossularia* Maskell; New Zealand.

*Unarmored—*

*Lecanium coryli* Linnaeus; Great Britain.

*Lecanium rehi* King; Europe.

*Lecanium rubi* Schrank; Europe.

*Phenacoccus socius* Newstead; British Isles.

*Pseudococcus apong* Maskell; New Zealand.
GRAINS AND GRASSES.

(Family Gramineae.)

Under this heading are treated the insects attacking the grains and grasses, except corn, sorghum, and sugar cane, which are treated separately. This section relates especially to barley (*Hordeum vulgare* Linnaeus), millet (*Panicum* spp.), oats (*Avena sativa* Linnaeus), rye (*Secale cereale* Linnaeus), timothy (*Phleum pratense* Linnaeus), and wheat, emmer, and spelt (*Triticum sativum* Lam.). Descriptions of these various crops are given in their proper alphabetic order.

A. BETTER KNOWN GRAIN INSECTS LIKELY TO BE IMPORTED.

*Lema cyanella* Linnaeus; *Lema melanopus* Linnaeus.

(Grain Leaf Beetles. Chrysomelidae; Coleoptera.)

*Hosts:* Grasses, grains, especially oats.

*Injury:* Feed on the leaves, stem and seed. Causes millions of dollars damage in some years.

*Biology:* Eggs shining yellow laid in rows of 10–20 near the midvein, and 40–50 on a leaf. The larvae feed on the leaves. *L. cyanella* pupates in a cocoon on the plant; *L. melanopus* pupates in the ground. The adults also feed on the foliage.

*Distribution:* Europe, Southwest Asia. Serious only in South Europe.


*Pharaxonotha kirschii* Reitt.

(Mexican Grain Beetle. Cryptophagidae; Coleoptera.)

*Hosts:* Corn, yams.

*Injury:* Larvae and beetles destructive to stored corn and other products.

*Description:* Small, shining, deep brown beetles, about three-sixteenth inch long. Larva elongate gray, each segment darker at middle with darker spaces each side bearing rather well-developed tubercles.

*Distribution:* Brazil, Guatemala, Mexico, Texas, and South Carolina.


*Lophocateres (Ostoma) pusillus* Klug.

(Siamese Grain Beetle. Trogositidae; Coleoptera.)

*Hosts:* Corn, rice, seeds of eggplant and gourd, rye, flour.

*Injury:* Larvae and beetles destructive to stored corn and other seeds.

*Description:* Flat, brown, with thorax prolonged into acute angles at sides, antennae clubbed at ends, minute. Larva white with blackish head and last segment elongate.

*Distribution:* Liberia, Siam, Ceylon, Java, India, Cochin China, Peru, Guatemala, France, South Carolina, Texas.


*Latheticus oryzae* Waterh.

(Long-Headed Flour Beetle. Tenebrionidae; Coleoptera.)

*Hosts:* Wheat, corn, barley, rice.

*Injury:* Larva and beetle injure stored grain and flour.

*Description:* Pale yellow, somewhat flattened beetle; the slenderest of the flour beetles, measuring one-eighth inch.

*Distribution:* India, Arabia, Persia, Norway, England, Russia, Texas.

Nonagria uniformis Dudgeon.

(Wheat Stem Borer. Noctuidae; Lepidoptera.)

*Hosts:* Rice, wheat, sugar cane, millet.
*Injury:* Larva bores in stems and pupates in its borings.
*Description and biology:* Larva flesh colored with black head. Bores in grass stems.
*Distribution:* India, Ceylon, Burma, Celebes.


Pyrausta nubilalis Hübner.

(Millet Stalk Worm. Pyralidae; Lepidoptera.)

*Hosts:* Millet, corn, hops, hemp, Panicum sanguinale, Artemisia vulgaris, Conyza squamosa, and Arundo.
*Injury:* Bores in the stems. 
*Description and biology:* Moth, wing expanse 28–30 mm., yellow ochre in color with rust colored marks on forewings. Larva dirty gray brown with dark dorsal line, and two black spots on each segment, underside whitish, head dark brown, thoracic shield yellowish, 30 mm. long. Bores in the stems and sometimes attacks the ears of corn. In grasses the larva overwinters in the roots.
*Distribution:* Europe (Hungary).


Ochsenheimeria taurella Schiffermiller.

(Rye Stem Borer. Tineidae; Lepidoptera.)

*Hosts:* Rye, grasses.
*Injury:* Quite injurious to winter rye.
*Description and biology:* Moth, 7 mm. long, with 13 mm. wing expanse, forewings yellowish brown with darker bands, hindwings white in basal part and brown beyond. Pupates in the stalk. Larva when young greenish or yellow, later yellow with dark head; bores in stems. Eggs laid singly.
*Distribution:* Europe.


*Tinea granella* Linnaeus.

(The Wheat Moth. Tineidae; Lepidoptera.)

*Hosts:* Wheat, barley.
*Injury:* Very serious injury to the seed heads.
*Description and biology:* Adult, a tiny moth colored a rich brownish yellow with the hindwings larger than the front and greenish yellow. Pupa a small brown chrysalid. Larva not over one-half inch long, yellowish; bores in the seed head, eating all but the husks.
*Distribution:* Victoria, Australia, Europe, North America.


Clinodiplosis mosellana Gehin; Clinodiplosis equestris Wagner; *Contarinia tritici* Kirby.

(Grain Gall Midges. Itonididae [Cecidomyiidae]; Diptera.)

*Species:* Cl. mosellana; France; wheat, rye. Cl. equestris; Europe; wheat. *C. tritici;* Europe, introduced into United States; wheat, rye, barley.
*Injury:* Very serious injury to grain, especially in United States.
Description: Fly of *equestris* red, of the other two orange yellow. Maggot of *equestris* blood red, of the other two orange or yellow. Breed in the stems and cause gall formation.


*Lasioptera cerealis* Lindeman.

*Injury:* Attacks the stems.
*Description and biology:* Fly black, abdomen white banded; 3 mm. long. Larva brick red, 5 mm. long.
*Distribution:* Russia.


*Mayetiola avensis* Marchal.

*Host:* Oats.
*Injury:* Forms galls in the stems.
*Description and biology:* Fly black, marked with red, with a band of silver-gray hairs on each side; length 3.2 mm. Has two generations.
*Distribution:* France.


*Phytophaga (Mayetiola) destructor* Say.

*Host:* Oat's Gall Midge. *Itonididae* [Cecidomyiidae]; Diptera.

The well-known Hessian fly is a conspicuous example among our imported pests. It is now distributed over Asia, Europe, and North America.

*Porcicondyla cerealis* Sauter.

*Hosts:* Barley, oats, rye, spelt.
*Injury:* Occasionally injurious. Breeds behind the leaf sheath.
*Description and biology:* Fly, antennae 13-jointed, thorax black, abdomen red, length 2.2 mm. Maggot, 3 mm. long, chrome red.
*Distribution:* Germany.


*Hylemyia coarctata* Fallen.

*Hosts:* Rye, wheat, barley.
*Injury:* Feeds in the stems; very destructive.
*Description and biology:* Fly yellowish gray, strongly bristled; thorax without stripes; abdomen with dark median stripe; antennae black; length 7 mm. Maggot yellowish, 6 mm. long. (See plate xxix figs. i, n.)
*Distribution:* Middle and north Europe. One specimen is recorded from Colorado.

GBAIN

INSECTS.

Hydrellia griseola Fallen.

(Grain Leaf Miner. Ephyridae; Diptera.)

Hosts: Barley, oats, grasses.
Injury: Mines the leaves.
Description and biology: Adult fly metallic brown, thickly dusted with gray; undersides and palpi yellow; antennæ black, face and beak brown; 2.75 mm. long. Larva 2 mm. long.
Distribution: Europe.

Camarota flavitarsis Meigen.

(Grain Fly. Oscinidae; Diptera.)

Hosts: Wheat, grasses.
Injury: Bores in stems.
Description and biology: Fly, blue black, undersides white, length 2.5 mm. Larva and pupa with two large stigmal hooks at apex.
Distribution: France.

Chlorops tæniopus Meigen.

(Straw Fly. Oscinidae; Diptera.)

Hosts: Wheat, rye, barley, grasses.
Injury: Bores in the stems of grains.
Description and biology: Fly, yellow, with three black lines on thorax, four black cross bands on abdomen and black antennæ; length, 3-4 mm. Maggot, yellowish white, 5-7 mm. long. Winters in stem near roots.
Distribution: Europe.

*Oscinis frit Linnaeus (Oscinis pusilla Melgen).

(Fruit Flies. Oscinidae; Diptera.)

Hosts: Oats, barley, wheat, rye.
Injury: Mines the stems of grains. Serious pests.
Description and Biology: Adult fly, shining black, metallic. Larva, white, legless. Mines the stems and roots.
Distribution: Europe, America.

B. OTHER IMPORTANT GRAIN INSECTS.

HEMIPTERA.

Lygaeidae.

Nysius vinitor Bergroth; Australia. (See Fruit.)

Jassidae.

Jassus serenatus Fallen of Germany is a very injurious insect to wheat, barley, oats, and grasses. The eggs might be imported with straw during the winter. This is a bright-yellow leaf hopper with black markings, measuring about 3.75 mm. in length.

THYSANOPTERA.

Haplothrips tritici Kurdjumov, the Europe grain thrips; Europe; often winters in wheat stubbles. (See pl. XXIX, fig. d.)

Haplothrips acetata Fabricius (see pl. XXIX, figs. a, b) and Limothrips denticornis Haliday; Europe; attack grain. (See pl. XXIX, fig. e.)
Carabidae.
Zabrus gibbus Fabricius of Europe attacks wheat, oats, rye, and barley, in both its adult and larval stages. It is a shining black beetle with piceous antennae and legs, measuring 15 mm. in length and 6 mm. in breadth. The adults hide during the day and feed at night on the grain. They might easily be imported.

Elateridae.
Agrisota lineatus Linnaeus. (See Tobacco.)

Cerambycidae.
Calamobius marginellus Fabricius; Europe; bores in stems of wheat.

Chrysomelidae.
Phyllophaga vitula Redtenbacher. (See Rape.)

Brachyrhynidae.
Dipteropus abbreviatus Linnaeus; West Indies. (See Sugar cane.)

LEPIDOPTERA.

Noctuidae.
Oria musculosa Hübnerr; Russia; very destructive, winters in egg stage in stubble. (See pl. XXIX, figs. c, g.)
Hadena secalis Bjerk; Europe; bores in stalks.
Trachea basitica W. V.; Europe; injures wheat, rye, and other grains. (See pl. XXIX, figs. f, h.)

Pyralidae.
Chilo simplex Butler; India, Formosa; attacks millet. (See Sugar Cane.)
Dichocrocis punctiferalis Guenée; Queensland; attacks millet. (See Corn.)

Phycitidae.
Anerastia botella Zük.; Europe; injurious to rye, wheat, and other cereals

DIPTERA.

Oscinidae.
Chlorops linata Fabricius; a tiny reddish frit fly of Europe which breeds in stems of wheat.
Oyopoma florid Fabricius, a small fly of Europe which breeds during the winter in the lower parts of the stems of wheat. It is 4.5 mm. long, pale yellow or reddish yellow in color.

Itonidae (Cecidomyiidae).
Clinodiplosis mosellana Gehin; Europe; breeds in stems of wheat and rye.

HYMENOPTERA.

Cepheididae.
* Cyphus pygmaeus Linnaeus of Europe bores in the stems of wheat, rye, timothy, and other cereals and grasses hibernating as a larva in the lower part of the stem or root. It could easily be imported in straw. The larva is legless. The adult is a black wasplike insect with yellow markings, measuring 7 mm. in length.
Trachelus tabidus Linnaeus; Europe; bores in stems. (See pl. XXIX, figs. l, m.)

Chalcididae.
Isosoma nassate Portschinski is a very injurious chalcid pest of grain in Russia. The larvae pass the winter in the stems. (See pl. XXIX, fig. k.)

GRANADILLA.

(Passiflora quadrangularis. Passifloraceae.)

A tropical American vine valuable as a climber and also for its fruit.

DIPTERA.

Trypetidae.
Dacus passiiflore Froggatt; Fiji. (See Fruit.)
Dacus psallii Froggatt; Fiji. (See Fruit.)
Dacus zanthodes Broun; Fiji. (See Fruit.)
Ceratitis capitata Wiedemann. (See Fruit.)
Ceratitis punctata Wiedemann; Africa. (See Fruit.)

LEPIDOPTERA.

Pyralidae.
Dichocrocis punctiferalis Guenée; Queensland. (See Corn.)
GRAPE INSECTS.

GRAPE.

(Vitis spp. Family Vitaceae.)

Fruit-bearing vines valued both for the fruit itself and for the wines derived therewith.

A. BETTER KNOWN GRAPE INSECTS LIKELY TO BE IMPORTED.

* Eriophyes vitis Landois.

(Grape Blister Mite. Eriophyidae; Acarina.)

Hosts: Vitis vinifera, V. vespertina, V. carinthiaca, V. arizonica, V. aestivalis.

Injury: Causes much damage to the vine.

Description and biology: Four-legged blister mite which attacks the leaves, buds, flowers, and berries of the grape.

Distribution: Europe, Armenia, North America.


Anomala vitis Fabricius.

(Grape Anomala. Scarabaeidae; Coleoptera.)

Host: Grape.

Injury: May be serious.

Description and biology: Adult, length 12-17 mm.; green, violet or azure; body oval; head, prothorax, and scutellum punctate; elytra convex with distinct longitudinal striae. Occurs in June and July; crepuscular; feeds on foliage of the vine. Pupates in soil in May; stage requires about a month. Larva feeds on roots of grass and the vine. Feeds about a year and a half. Egg oblong, hatches in about 15 to 20 days.

Distribution: Middle and eastern Europe.

Silvestri, F. Dispense di Entomologia Agraria, 1911, p. 310.

Sinoxylon perforans Schrk.; Sinoxylon sexdentatum Olivier.

(Grape-vine Flat-headed Borers. Bostrychidae; Coleoptera.)

Species: S. perforans; Tirol, Italy, grape; Europe, oak, elm, horse chestnut. S. sexdentatum; Spain, grape; South France, Quercus sessiliflora.

Injury: Bore in the stems, branches, and trunk; sometimes causing very serious injury.


Vesperus spp.

(Grape Borers. Cerambycidae; Coleoptera.)

Species: V. xatarti Dufour; France; grape. V. luridus Rossi; Italy; grape. V. strepens Fabricius; France; grape, rose, forest trees. V. mauretanicus Dry; Algeria, Spain; grape, olive.

Injury: Bore in stems.


* Bromius obscurus Linnaeus.

(Grape Root Worm. Chrysomelidae; Coleoptera.)

Hosts: Grape, Epilobium, etc.

Injury: Sometimes serious. Attacks both the roots and the growing parts of the vine.

Description and biology: The species has two varieties, obscurus, which is black, and vitis Fabricius, which is brown. The eggs are laid in crevices beneath the inner
layers of bark on old wood, and also on leaves, in clusters of 4 to 30. Eggs yellowish white, elongate cylindrical. Larva white, with yellowish-brown head, short legs. Pupa white, formed in earthen cell. The larva feeds on the roots several feet under ground, doing much damage. The adults feed on the foliage and fruit.

**Distribution:** Europe, Asia, North Africa, and introduced into California.


**Haltica am nepholaga** Leeb.

*Hosts:* Grape, willow.

*Injury:* Serious. Defoliation.

**Description and biology:** Adult, length 4 mm.; brilliant green, sometimes deep blue-green. Two generations, first appears in April (France), feeds on leaves. Pass winter as adults at bases of vines, in bark, etc. Pupate in soil. Larva, length 6 mm., black;

feeds on leaves, flowers, and shoots. Larval period of first generation about a month. Eggs clear yellow, oblong; placed on under surface of leaves in clusters of about 30. (See text fig. 65.)

**Distribution:** France, Italy, Spain, Algiers.


**Scelodnot a strigicollis** Motschulsky.

*Host:* Grape.

*Injury:* Serious pest.

**Description and biology:** Probably similar to grape rootworm.

**Distribution:** India.


**Brachyrhinus (Oti orhynch us)** spp.

(Grape Root Weevils. Brachyrhinidce (Oti orhynchidae); Coleoptera.)

The weevils of this genus breed at the roots of plants and are very destructive as adults, often defoliating vineyards.
Species: B. raurus Fabricius; Germany, France; adults attack foliage of apple, pear, cherry, grape. B. singularis Linneus; Europe (England); adults attack grape, grafted fruit trees, oak, rose, hops, *Rhododendron*, pines, gherkins, spruce, and strawberries. B. turca Boheman; Russia; breeds at the roots of grape. *B. sulcatus* Fabricius; Europe, introduced into America and Australia; breeds at the roots of grape, strawberry, and many other plants and is a very destructive pest. B. populeti Boheman; Hungary; adults injurious to grape. B. ligustici Linneus; Europe; attacks grape, peach, hops, beans, beets, asparagus, lucerne. Breeds at the roots and is very destructive. B. armatus Boheman. B. asphalitus Germar, B. corruptor Host., B. globus Boheman, B. terctirostris Stierlin and B. tristis Scopoli are also recorded from grape.

Description: These weevils are practically all black, oval, fairly large, with broad blunt beaks.


**Boarmia gemmata** Brahm.

*Geometridae; Lepidoptera.*

Hosts: Grape, wild honeysuckle, rose.

Injury: Very injurious. Defoliation.

Description and biology: Adult, wings 19–20 mm.; brownish gray with white markings. Larva, grayish brown in color, with dark yellow and black spots and dark wavy side lines; occurs in July; winters in sheltered places. Pupates during spring in ground.

Distribution: Europe.


**Cryptoblabes gnidleta** Mill.

*Pyralidae; Lepidoptera.*

Host: Grape.

Injury: To fruit.

Description: Adult, wings lead gray, two diagonal whitish stripes between which are blackish spots. Larva, length 14 mm., dirty brown with broad, dark side stripes. Feeds on unripe grape berries.

Distribution: Southern Europe, Egypt.


**Sciopteron regale** But.

*(Grape Gun Worm. Sesiidæ; Lepidoptera.)*

Host: Grape.

Injury: Bore in canes of the grape; very destructive in Japan.

Description and biology: Adult moth, about 18 mm. long and with wing expanse of 37 mm.; general color orange and black. Larva, 18 to 25 mm. long, yellow, feet and head darkish brown. Pupa, about 18 mm. long, rich amber brown in color.

Distribution: Japan.


**Clysia ambigua** Hübner.

*(The Cochylis. Tortricideæ; Lepidoptera.)*

Host: Grape.

Injury: Very serious to blossom clusters and fruit. One of the worst grape pests of Europe.

27812—18—9
Description and biology: Adult, wing expanse 14-15 mm.; forewing yellow, with a large dark brown transverse band; hindwing gray. Two generations. First occurs at time of flowering of grape; second generation in early August (France). Pupae in early winter under bark scales, in crevices of grape stakes, etc. Larva, length 12 mm., at first whitish, later taking on a rose color. Egg placed singly on blossom clusters and on grapes. (See text fig. 66.)

Distribution: Europe, Asia Minor, Japan, India.

Montillot, L. Entomologie et Parazitologie Agricoles, 1904, p. 335.

Polychoris botrana Schiffermiller.

(The Pyralid of the Vine. Tortricidae; Lepidoptera.)

Host: Grape.

Injury: Very injurious. Attacks grape blossoms and fruit.

Description and biology: Adult, wing expanse 12 mm.; forewings pale yellow with three transverse brown lines; hind wings grayish brown. Three annual generations. Pupa brown. Larva, length 1 cm.; green in color. Eggs deposited on berries and on blossom clusters. (See text fig. 67.)

Distribution: Germany, Austria-Hungary, Switzerland, France, Italy, Asia Minor.

Montillot, L. Les Insectes Nuisibles, 1891, p. 120.


IMPORTANT GRAPE INSECTS.

HEMIPTERA.

Coccidae:

Armored—

Aspidiotus (Chrysomphalus) pedroniformis Cockerell and Robinson; Philippines; Vitis vinifera.

Aspidiotus (Pseudoaonidia) fischeri Newstead; Barbados.

Aspidiotus (Pseudoaonidia) articularis Morgan; West Indies.

Aspidiotus (Pseudoaonidia) tessera De Charmoy; Mauritius, Mexico, Antigua.

Ohionaspis vitis Green; Ceylon, Japan.

Unarmored—

Crypplingia lounsburyi Cockerell; on roots; Cape Colony.

Gueriniella serrula Fabricius; Algeria, Europe.

Icerya palmeri Riley & Howard; Mexico.

*Lecanium persicae Fabricius; Australia, France, Italy, Caucasus, California.

*Lecanium vini Bouché; France.

*Nolocnium silveiraí Hempel; on roots; Brazil.

*Palsoococcus rosaí Riley & Howard; Jamaica.

Pseudococcus flamentosus Cockerell; Japan, Hawaii.

Pseudococcus subterranus Hempel; on roots; Argentina.

Pseudococcus vitis Niediecki; North Africa, France, Europe, Palestine.

Pulex femoralis vinifera King.

Rhyococcus fulvus Köhnel; France, Algeria.

Solenococcus murator Kuwana; Japan.

Lygaeidae.

Nyasus vinitor Bergroth; Australia. (See Fruit.)
Buprestidae.
*Agrilus viridis* Linnaeus; Europe. (See Oak.)

Scarabaeidae.
*Aderus umbrosus* Fabricius; Pacific Islands. (See Rose.)

Cerambycidae.
*Cerambyx miles* Bon.; Austria; bores stems of *Vitis vinifera*.
*Heterachthes aneolus* Bates; Mexico; bores stems of *Vitis vinifera*.

Curculionidae.
*Oothorhis klugii* Schônherr; Victoria; bores in canes.

**LEPIDOPTERA.**

Tortricidae.
*Capua angustiorana* Haworth; Europe, Asia, Africa. (See Apricot.)

Zygaenidae.
*Ina amphilopha* Boyle; Europe, Caucasus, Palestine; attacks buds and leaves.

Trypetidae.
*Ceratitis capitata* Wiedemann, attacks *Vitis vinifera*. (See Fruit.)

Itonididae.
*Contarinia viticola* Ribssamen; Europe; breeds in buds and flowers.

**GUAVA.**

*(Psidium guajava, etc. Family Myrtaceae.)*

Evergreen trees and shrubs of tropical and subtropical America, yielding delicious fruits. Several species are grown in Florida and California.

**IMPORTANT GUAVA INSECTS.**

**HEMIPTERA.**

Coccidae.

Armored—
*Aspidiotus (Pseudaonidia) articulatus* Green; Jamaica.
*Aspidiotus (Pseudaonidia) trilobiformis* Green; Ceylon. (See citrus.)
*Parlatoria zisphus* Lucas; Philippine Islands.
*Chionaspis (Phenacaspis) megaloba* Green; Ceylon. Unarmored—
*Ceroplastes singularis* Newstead; British East Africa, Uganda.
*Ceroplastes vinsonii* Signoret; Mauritius.
*Coccus acuminatus* Signoret; Hawaii, Ceylon.
*Coccus viridis* Green; Uganda, India, Mauritius, Ceylon, Brazil.
*Eriococcus coriaceus* Maskell; Victoria, New South Wales, Queensland.
*Icerya montserratensis* Riley & Howard; New South Wales; *Psidium pomerium*.
*Icerya vayellaria* Westwood; Mauritius.
*Inglisia conchifera* Newstead; Uganda.

**Fig. 67.—Grape pyralid (Polychrosis botrana):** Adult, larvae, pupa, egg, and injured grape. (Silvestri.)

*Ceroplastes psidii* Chavannes; Brazil, Europe.
Aeyrodidae.  
Aleurodicus cocois Curtis; West Indies, Mexico, Central and South America, attacks Psidium guajava.  
(See Coconut.)

THYSANOPTERA.

† Heliothrips rubrocaecus Giard; West Indies, Ceylon, Uganda, Florida, attacks Psidium guajava.  
(See Fruits.)

Brachyrhinidae.

Diaprepes abbreviatus Linnaeus; West Indies.  
(See Sugar cane.)

COLEOPTERA.

Brachyrhinidee.

Diaprepes abbreviatus Linnaeus; West Indies.  
(See Sugar cane.)

LEPIDOPTERA.

Lycaenidae.

Virachola insocrates Fabricius; India; bores in fruit.  
(See Fruit.)

Pyralidae.

Dichocrocis punctiferalis Gn. Queensland.  
(See Corn.)

Lasiocampidse.

Siionaconcotor Walker; Java.

DIPTERA.

Trypetidae.

Anastrepha fraterculus Wiedemann, attacks Psidium guajava.  
(See Fruit.)

Hawthorn; Medlar.

(Mespilus spp. [Crataegus]. Family Rosacese.)

Small fruit-bearing trees and shrubs of the northern hemisphere, grown mainly as ornamental shrubbery.

IMPORTANT HAWTHORN INSECTS.

ACARINA.

Eriophyidae.

Eriophyes goniotherox Nalepa, blister mite; England; attacks leaves of Mespilus oxyacantha.

HEMIPTERA.

Coccidae:

Armored—

Aspidiotus (Diaspidiotus) pyri Lichtenstein; Europe; Mespilus heterophylla, 'oxyacantha.

Diaspis le péril Signoret; Europe; Mespilus monogyna.

Unarmored—

Oroplastis rusc Linnaeus; Europe.

* Lecanium bituberculatum Targioni-Tozzetti; Europe; Oregon; Mespilus monogyna, M. oxyacantha.

Lecanium coryli Linnaeus; Europe; Mespilus coccinea, M. germanica, M. monogyna, M. oxyacantha, M. pyracaenata.

Pulvinaria betular; Europe; Mespilus germanica, M. monogyna, M. oxyacantha.

COLEOPTERA.

Curculionidae.

Magdalis cerasi Linnaeus and M. pruni Linnaeus; Europe; breed under bark.

Magdalis barbicorne Latreille; Europe.  
(See Apple.)

LEPIDOPTERA.

Geometridae.

Hibernia aurantiaria Esp., II. defoliaria Linnaeus and H. marginaria Borckh; Germany; defoliators.

Lymantriidae.

Dasychira pudibunda Linnaeus and * Euproctis chrysoorhor Linnaeus; Europe; defoliators.  
(See Fores: defoliators.)

Lasiocampidae.

Coleonoptera quercifolia Linnaeus; Europe.  
(See Fruit.)

Hyponomeutidae.

Argyrothia nikidella Fabricius; England.  
(See Plum )
INSECTS OF HAWTHORN AND HAZEL.

DIPTERA.

Trypetlidae.

Cratitlis capiita Wiedemann. (See Fruit.)

HYMENOPTERA.

Tenthredinidae.

Macropbya punctum-album Linnaeus; Russia; sawfly.

Priophorus padl Linnaeus; Europe (See Plum.)

LITERATURE.


LINDINGER, L. Die Schilfsluse (Coccidse), 1912

HAZEL; FILBERT; COBNUT.

(Corylus spp. Family Corylaceae.)

Valuable nut-bearing shrubs or rarely trees of America, Europe, and Asia, sometimes used for shrubbery.

A. HAZEL INSECTS LIKELY TO BE IMPORTED.

Eriophyes avellanae Nalepa; Eriophyes verliformis Nalepa.

(Hazelnut Blister Mites. Family Eriophyidae; Acarina.)

Hosts: Corylus avellana, C. tubulosa.

Injury: Cause galls on buds. Serious in England.

Description and biology: Four-legged blister mites which form galls in the spring and summer buds. Very easy to introduce on nursery stock.

Distribution: England, Europe.


Oberea linearis Linnaeus.

(Cerambycidae; Coleoptera.)

Hosts: Hazelnut, walnut.

Description and biology: Adult, beetle occurs from May on. A generation in two years. The larva eats pith and wood and pupates in earth. Eggs are placed singly under young bark. After oviposition the female rings the twig.

Distribution: Europe.


Curculio nucum Linnaeus (Balaninus).

(Nut Weevil. Curculionidae; Coleoptera.)

Hosts: Hazelnut, filbert, cob, oak.

Injury: Causes nuts to fall prematurely.

Description and biology: Adult, length 8 mm.; color tawny brown to chocolate brown, densely clothed with golden-brown pubescence; has unusually long snout; occurs in June and July (England). Flies in bright weather. Pupa creamy white, pupates in soil. Larva length rather more than 8 mm.; creamy white; passes winter in cell in ground. Eggs are deposited singly, deep in nut. Incubation requires 8 or 10 days. (See text fig. 68.)

Distribution: Europe.

THEOBALD, F. V. Insect Pests of Fruit, 1909, p. 299.
Laspeyresia amplexa Hübner (Carpocapsa.)

Hosts: Hazelnut, walnut.

Injury: To fruit.

Description and biology: Forewing cinnamon colored, with large light spots on both sides darkened by brown spots on the inner margin. Flies in July (Germany). Larva, dirty white; head and back darker; bores into the nuts; overwinters in soil, pupating in spring. Eggs deposited on unripe nuts.

Distribution: Europe.


B. IMPORTANT HAZEL INSECTS.

HEMIPTERA.

Coccidæ.

Unarmored—

Lecanium coryli Linnæus; Europe; Corylus avellana, C. colurna.

Lecanium pulchrum Marchal; Europe; Corylus avellana.

Phenacoccus acrae Signoret; Europe; Corylus avellana.

Pulvinaria betulae Linnæus; Europe; Corylus avellana.

COLEOPTERA.

Buprestidæ.

Agrilus angustulus Illiger; A. subauratus Gebler; Europe; bores in bast and sapwood, especially of saplings.

Elateridæ.

Athous subsuscus Müller, wireworm; Europe; injures nuts and seedlings.

LEPIDOPTERA.

Geometridæ.

Anisopteryx xesularia Schiffermiller; Europe; feeds on foliage.

Lymantriidæ.

Dasychira pudibunda Linnæus, and Lymantria monacha Linnæus; Europe; defoliators. (See Forest defoliators.)

Notodontidæ.

Phalera bucephala Linnæus; Europe. (See Forests.)

Tortricidæ.

Laspeyresia grossana Haworth (Carpocapsa); Europe. (See Beech.)

Hyponomeutidæ.

Agryresthia cephippella Fabricius; Europe. (See Plum.)

HYMENOPTERA.

Tenthredinidæ.

Monoctenus juniperi Linnæus; Europe; sawfly feeds on foliage.
INSECTS OF HAZEL, HEMLOCK, HEMP, HOPS.

LITERATURE.
Hess, R. Der Forstschutz, 1900, vol. 2.
Lindinger, L. Die Schildläuse (Coccidae), 1912.

HEMLOCK SPRUCE.
(Tsuga spp. Family Pinaceae.)
Ornamental evergreen trees, very useful for parking, native of North America, East Asia, and the Himalayas. For convenience the insect pests are arranged under Conifers.

HEMP.
(Cannabis sativa Linnaeus. Family Urticaceae.)
A native of Asia cultivated for the fiber obtained from its stems. Also used as an ornamental plant.

IMPORTANT HEMP INSECTS.

COLEOPTERA.
Chrysomelidae.
Psyllodes attenuata Koch; Europe. (See Hops.)

LEPIDOPTERA.
Pyralidae.
Pyrausta nubilalis Hübner; Europe. (See Grain.)

HOPS.
(Humulus lupulus Linnaeus. Family Urticaceae.)
Vines cultivated in Europe and America for the hops, which are used in the brewing of beer.

A. BETTER KNOWN HOPS INSECTS LIKELY TO BE IMPORTED.

Psyllodes attenuata Koch.
(European Hop Flea-Beetle. Family Chrysomelidae; Coleoptera.)

Hosts: Hops, hemp, stinging nettle.
Injury: Feeds on foliage. The larva is supposed to breed in the cones of the hops.
Distribution: Europe (Russia, England).


Hepialus humuli Linnaeus.
(Hop Root Borer. Hepialidae; Lepidoptera.)

Hosts: Hops, potato, rape, corn, sorrel, dandelion.
Injury: Bores in the roots.
Description and biology: Moth, wing expanse 43–68 mm.; male above silvery white, beneath brownish gray, female clay yellow, with pale brick-red marks on forewings. Larva yellowish, spotted with black, with dark head; thoracic shield and spots on second and third segments yellowish brown; 50–55 mm. The larva breeds in the roots.
Distribution: Europe.


Cecidomyia humuli Theobald.
(Hop Midge. Itonididae [Cecidomyiidae]; Diptera.)

Host: Hops.
Injury: Attack the catkins.
Description and biology: Fly very small; larvae white.

Distribution: England.


Agromyza frontalis Meigen.

(Hop Leaf Miner. Agromyzidae; Diptera.)

Host: Hops.

Injury: Mines the leaves.

**Fig. 69.**—Needle-nose hop-bug (*Calocoris fulvomaculatus*): a, Adult; b, early stage of nymph; c, 4th instar nymph; d, 5th instar nymph. (Theobald.)

Description and biology: Pupates in the soil.

Distribution: Europe.


**B. OTHER IMPORTANT HOPS INSECTS.**

**HEMIPTERA.**

Miridae (Capsidae).

*Calocoris fulvomaculatus:* Needle-nosed hop bug; Europe; sucks juices. (See text, fig. 69.)
INSECTS OF HOPS, HORNBEAM, HORSE-CHESTNUT.

COLEOPTERA.

Chrysomelidae.
*Phyllotreta nemorum* Linnaeus; Europe. (See Crucifers.)

Elateridae.
*Agrilodes lineatus* Linnaeus. (See Tobacco.)

LEPIDOPTERA.

Pyralidae.
*Pyrausta nubilalis* Hübnner; Europe; bores in stems. (See Grain.)

Noctuidæ.
*Hympa rostralis* Linnaeus; Europe; feeds on foliage.

LITERATURE.


HORNBEAM.

(Carpinus betulus L., etc. Family Betulaceæ.)

Hard-wooded trees much used in tool making. Occur in Europe, Asia, and America.

IMPORTANT HORNBEAM INSECTS.

HEMIPTERA.

Coccidae:
Unarmored—
*Pulvinaria betulx* Linnéus; *Lecanium coryli* Linnaeus, and *Lecanium pulchrum* Marchal; Europe.

COLEOPTERA.

Anobiidæ.
*Xestobium rufovillosum* DeGeer; Europe; bores in the wood.

Ptilinus pectinicornis Linnaeus; Europe; bores in the wood.

Elateridae.
*Atheta subfusca* Müller; wireworm; Europe; injures fruit and seedlings.

Scarabæidæ.
*Amphimallon solstitialis* Linnaeus; Europe; the larvae injure the roots of small plants while the adult injure the shoots.

Melolontha hippocastani Fabricius, and *M. melolontha* Linnaeus; Europe; larvæ injure roots of seedlings.

Scolytidae.
*Anisandrus dispar* Fabricius; Europe; galleries in wood.

Scolytus carpini Ratzeburg; Germany; galleries in bark, bast, and sapwood.

*Xylopterus domesticus* Linnaeus; Germany; galleries in bark and sapwood.

LEPIDOPTERA.

Geometridæ.
*Hibernia defoliaria* Linnaeus and *H. marginaria* Borch.; Europe; defoliators.

Lymantriidæ.

LITERATURE.

LINDINGER, L. Die Schildläuse (Coccidæ). 1912.

HESS, R. Der Forstschutz, 1900, vol. 2.

NÜSSLIN, O. Leitfaden der Forstinsektenkunde, 2d ed. 1913.

HORSE-CHESTNUT; BUCKEYE.

(Aesculus spp. Family Sapindaceæ.)

Ornamental trees and shrubs, desirable for shade trees, occurring in North America, Asia, Europe.
A. HORSE-CHESTNUT INSECT LIKELY TO BE IMPORTED.

* Zeuzera pyrina Linnaeus.

(Horse-chestnut Borer. Cossidae; Lepidoptera.)

Hosts: Elm, alder, ash, beech, birch, horse-chestnut, linden, maple, oak, willow, poplar, buckthorn, spindle tree, mountain ash.

Injury: Bores in bark and wood of trees.

Description and biology: Moth white, with steel-blue round spots; wing expanse 50-70 mm. Larva yellowish, more flesh-colored when younger, with shining black, warts; head, thoracic shields and legs black. The larva bores in the wood and pupates in a cell of frass near the outside.


B. IMPORTANT HORSE-CHESTNUT INSECTS.

HEMIPTERA.

Coccidae.
Unarmored—
Lecanium coryli Linnaeus; Europe; Aesculus hippocastanum, A. pavia.

COLEOPTERA.

Anobiidae.
Xestobium rufovillosum De Geer; Europe; bores in dead wood of standing and living trees.

Bostrychidae.
Sinoxyylon perforans Schr.; Europe; bores in branches.

Scarabaeidae.
Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; larvae injure roots of seedlings.

Cerambycidae.
Phymatodes lividus Rossi; Germany; bores in wood of felled trees and lumber.

Ipidae.
Anisandrus dispar Fabricius; Germany; galleries in wood.

LEPIDOPTERA.

Geometridae.
Anisopteryx xescularia Schiffermiller; Europe; feeds on foliage.

LITERATURE.


HORSE-RADISH.

(Radicula armoracia. Family Cruciferae.)

An herb cultivated for its roots.

IMPORTANT HORSE-RADISH INSECTS.

COLEOPTERA.

Chrysomelidae.
Phylloptera nigripes Fabricius, and P. armoracize Koch; Europe, North America. (See Cruciferae.)

Pyralidae.
Pionea forficatus Linnaeus; Europe. (See Cabbage.)
INSECTS OF IRIS, JICACO, AND JUNIPER.

IRIS.

*(Iris spp. Family Iridaceae.)*

Flowering herbs, propagated from roots.

IRIS INSECTS.

DIPTERA.

*Syrphidae.*

*Syngamus striatus* Fallen, Europe, New York; attacks tubers. (See Onion.)

JICACO; COCOA PLUM.

*(Chrysobalanus icaco. Family Rosaceae.)*

A tropical plant introduced into Florida.

JICACO INSECTS.

HEMIPTERA.

*Aleyrodidae.*

*Aleurodicus coccus* Curtis; West Indies, Mexico, Central and South America. (See Coconut.)

DIPTERA.

*Trypetidae.*

*Ceratitis giffardi* Bezzi; Africa; attacks fruit of *Chrysobalanus ellipticus.* (See Fruit.)

*Ceratitis silvestrii* Bezzi; Africa. (See Fruit.)

JUNIPER; RED CEDAR.

*(Juniperus spp. Family Juniperaceae.)*

Ornamental evergreen trees or shrubs distributed throughout the extratropical regions of the northern hemisphere. The wood is used in finishing interiors of houses, for posts, and the manufacture of small articles, especially pencils. The fruit of *J. drupacea* is edible. Aromatic oils used in medicine are obtained from the fruit and branches of some species.

*Eriophyes quadrisetus* F. Thoms.

*(Juniper blister mite. Eriophyidae; Acarina.)*

*Host:* *Juniperus communis.*

*Injury:* Causes deformations.

*Description and biology:* A four-legged blister mite which forms gall-like swellings of the fruit and needle. Very easy to introduce on nursery stock.

*Distribution:* Europe.

INSECTS INJURIOUS TO JUNIPER.

HEMIPTERA.

*Coccoidea.*

*Armored—*

*Aspidiotus madresensis* Lindinger; Madeira; *Juniperus cedrus.*

*Chimonaspis striata* Newstead; South Europe; *Juniperus drupacea, J. fatidissima, J. macrocarpa, J. oxycedrus, J. phanicea.*

*Cryptaspidotus mediterraneus* Lindinger; Algeria, Greece; *Juniperus macrocarpa, J. phanicea.*

*Diapsis atlantica* Lindinger; Canary Islands; *Juniperus phanicea.*


*Lepidosaphes juniperi* Lindinger; Anatolia; *Juniperus excelsa.*

*Unarmored—*

*Pseudococcus voces* Nassonow; Russia; Austria; *Juniperus communis.*
Ipidae.
Phizosinus thujae Perris; Europe; Juniperus communis.

Coleoptera.

Tortricidae.
Laspeyresia duplicana Zetterstedt; Europe. (See Conifers.)

Lepidoptera.

Leptidea.
Laspeyresia duplicana Zetterstedt; Europe. (See Conifers.)

Bibliography.

L. Lindinger, Die Schildläuse (Coccidae). 1912.

See Sorghum.
See Cabbage.

KAFIR CORN.

KEI APPLE.

(Aberia caffra.)

A tree of Cape of Good Hope, introduced into California and Florida and quite hardy in southern California. A spring plant grown for hedges. The fruit is used as pickles or conserves.

A KEI APPLE INSECT.

Diptera.

Trypetidae.

Ceratitis capitata Wiedemann. (See Fruit.)

Kohl-Rabi.

See Cabbage.

KOLA; COLA.

(Sterculia acuminata. Family Sterculiaceae.)

Tropical African trees cultivated for the nuts.

A. KOLA INSECTS.

Thysanoptera.

* Heliothrips rubrocinexus Giard; West Indies, Ceylon, Uganda, Florida. (See Fruits.)

Hemiptera.

Coccidae.

Lecanium catori Green; Algeria; on pods.

Larch.

(Larix spp. Family Pinaceae.)

Valuable ornamental and forest trees grown in the colder regions of Europe, Asia, and North America. L. decidua (European), the European larch, yields turpentine and the bark contains tannin, used for tanning leather. For convenience the insect pests are arranged under Conifers.

Lettuce.

(Lactuca spp. Family Compositae.)

A well-known genus of herbs grown for their edible foliage.

Important Lettuce Insects.

Diptera.

Elateridae.

Agriotes lineatus Linnaeus. (See Tobacco.)
A Destructive Mango Insect.

Mango bark borer (Proctotrupes ruficollis) a, Larvæ; c, cocoon; d, pupa; e, male; f, female. (Jones.)
INSECTS OF LETTUCE AND LINDEN.

LEPIDOPTERA.

Pyralidae.
* Pionea fennegalis Hübner; Europe, Asia, North America. (See Cabbage.)

Noctuidae.
Mamestra brassicae Linnæus; Europe; feeds on leaves.

LINDEN; BASSWOOD; LIME.

(Tilia spp. Family Tiliaceae.)

Trees distributed generally throughout the northern temperate zone. The wood of several species is easily cut into veneers and is hence in much demand for light boxes for packing fruits, etc. They are valuable honey trees.

A. LINDEN INSECTS LIKELY TO BE IMPORTED.

Erionyche tiliae Nalepa.

Host: Tilia cordata, T. grandifolia.

Injury: The first-mentioned mite forms galls on the flower bracts, and the second on the leaves, but neither is of vital importance.

Distribution: England.


B. IMPORTANT LINDEN INSECTS.

HEMIPTERA.

Coccidæ.
Armored—
Chionaspis salicis Linnaeus; Europe.

Unarmored—
Lecanium coryli Linnaeus; Europe.

Xylococcus filifer Loew; Europe; Tilia cordata, T. grandifolia.

Pyrhocoridae.
Pyrhocoris apterus Linnaeus; Germany; in all stages sucks the juices from the leaves, fruit, and stems.

COLEOPTERA.

Buprestidae.
Agrilus viridis Linnaeus; Europe; bores in stems and branches. (See Oak).

Lampra rutilans Fabricius, and L. undatus Fabricius; Europe; bore in bark and wood.

Scarabæidae.
Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; larvae injure roots of seedlings.

Ipidae.
Erotylon caucasicus Lind.; bark beetle; Europe.

Erotylon tiliae Panzer; bark beetle; Europe; Tilia peregrina.

Xylothere domesticus Linnaeus, and X. signatus Fabricius; ambrosia beetles.

LEPIDOPTERA.

Cossidae.
Cossus cossus Linnaeus, goat moth; Europe; bores in wood. (See Willow.)

†Zeuzera pyrina Linnaeus; Europe; bores in wood. (See Horse-chestnut.)

Noctuidae.

Xylina socia Rott.; Europe. (See Plum.)

Geometridae.
Hibernia aurantia Esp., H. defoliaria Linnaeus, and H. marginaria Borekh.; Europe; defoliators.

Lasiocampidae.
Eriogaster lanestris Linnaeus; Germany; defoliator.

Lymnantridae.
Dasychira pudibunda Linnaeus, *Lymantria monacha* Linnaeus, *Porthetria dispar* Linnaeus, and Porthesia similis Fuessly; Europe; defoliators. (See Forest defoliators.)
LOQUAT.

(*Eriobotrya japonica.* Family Rosaceae.)

A fruit tree native of China and Japan, much planted in the Gulf States. The fruit occasionally reaches the northern markets.

**IMPORTANT LOQUAT INSECTS.**

**HEMIPTERA.**

*Coccidae.*

Unarmored—

*Ceroplastes vinsonii* Signoret; Mauritius; Reunion Island.

**LEPIDOPTERA.**

*Lycaenidae.*

*Virachola insocrates* Fabricius; India; bores in fruit. (See Fruit.)

*Pyralidae.*

*Dichocrocis punctiferalis* Guenée; Queensland. (See Corn.)

**DIPTERA.**

*Tryptidae.*

*Ceratitis capitata* Wiedemann, fruit fly. (See Fruit.)

*Bactrocera tryoni* Frogsatt; Orient. (See Fruit.)

MAHOGANY.

(*Swietenia mahogoni.* Family Meliaceae.)

A tropical tree of great importance in the furniture trade, offered by nurseriesmen of Florida and California.

**IMPORTANT MAHOGANY INSECTS.**

**LEPIDOPTERA.**

*Cossidae.*

*Zeuzera coffeae* Nietner; Orient. (See Coffee.)

*Pyralidae.*

*Hypospyla robusta* Moore; India; twig borer.

MAIZE.

**MAMMEE APPLE.**

(*Mammea americana.* Family Guttiferae.)

Tropical fruit tree now cultivated in Florida and California.

**MAMMEE APPLE INSECTS.**

**DIPTERA.**

*Tryptidae.*

*Ceratitis capitata* Wiedemann. (See Fruit.)

*Dacus xanthodes* Broun; Fiji. (See Fruit.)

MANGEL.

MANGO.

(*Mangifera indica.* Family Anacardiaceae.)

A much-cultivated fruit tree originating in the Orient and now extensively cultivated in the West Indies and also in Florida and California.
Mango Insects.

A. BETTER KNOWN MANGO INSECTS LIKELY TO BE IMPORTED.

Psylla clstellata Buckton.

(The Mango Shoot Psylla. Psyllidae; Hemiptera.)

Host: Mango (Mangifera indica).

Injury: Injures terminal shoots by producing imbricated pseudo-cones of a bright green or yellow color in which the larval and pupal stages are passed.

Description: Adult head small, eyes globose and prominent; abdomen deeply corrugated and ringed; general color of body shining pitchy black.

Distribution: India.


- Dinoderus distinctus Lesne.
  (Bostrychidae; Coleoptera.)

Hosts: Mango, bamboo.

Injury: Infests branches.

Description: Adult brown, with reddish tinge at base of elytra. Marginal teeth of prothorax very small, the two middle ones longest. Length 3.5 mm. (See text fig. 70.)

Distribution: India.


Stebbing, E. P. Indian Forest Insects, 1914, pp. 129, 130.

Plocaederus ruficornis Newman.

(The Mango Bark Borer. Cerambycidae; Coleoptera.)

Host: Mango.

Injury: Considered one of the most formidable pests of the Philippine Islands.

Description and biology: Adult beetle 23 to 45 mm. in length with antennae longer than body; body dull blackish in color, antennae reddish brown, thorax with sharp spine on each side, legs of same rufous color as antennae. Eggs deposited singly on the bark or in crevices of wounds near lower part of the trunk. Larvae on hatching bore into the inner part of bark, where the entire grub stage is passed; pupate in a cavity made of grass. (See plate xxx.)

Distribution: Philippine Islands.


Sternochetus gravis Fabricius. (Cryptorhynchus).

(Northern Mango Weevil. Curculionidae; Coleoptera.)

Host: Mango.

Injury: This is the common mango weevil of Northern India, and is liable to be introduced in seed.
Description and biology: Adult weevil rusty brown to blackish brown, mottled with grayish patches; length 9 mm. Beak long. The entire development takes place in the fruit, the larvae first feeding in the pulp, then entering the seed. (See text fig. 71.)

Distribution: India (Bengal, Assam, United Provinces).

Sterbing, E. P. Indian Forest Insects, Coleoptera, p. 436, fig. 289.

*Sternochetus mangiferae* Fabricius. (Cryprohynchus.)

(Mango Weevil. Curculionidae; Coleoptera.)

Host: Mango.

Injury: Serious enemy of mango, especially in Hawaii, where it is reported to have infested from 60 to 90 per cent of the crop. Liable to be introduced in seed.

Description and biology: Adult weevil, varies from 6 to 8 mm. in length; when nearly developed whitish pink in color, later changing to a dark brown with yellow markings; beak short, thick, and when at rest turned back beneath the thorax in a groove terminating between the first pair of legs. The egg is deposited in the fleshy part of the fruit, and on hatching the larva enters the seed, where it undergoes its entire development, vacating as an adult.

---

Fig. 71.—Northern mango weevil (*Sternochetus gravis*): Adult. (Maxwell-Lefroy.)

Fig. 72.—The mango weevil (*Sternochetus mangiferae*): a, Adult weevil, from above; b, same, from below. Much enlarged. (Marlatt.)

Distribution: Inhabits all mango regions bordering Indian Ocean, East Indies including Philippines, Madagascar, Hawaii, Labuan, Straits Settlements, and South Africa. (Text figs. 72, 73.)


**Dacus rarotongae** Froggatt.

(Raratonga Fruit Fly. Trypetidae; Diptera.)

*Host:* Mango.

*Injury:* Larvae feed in fruit.

*Description:* Adult female length 9 mm., thorax shining black; wings hyaline; abdomen diamond shaped; anal segment and ovipositor yellow.

*Distribution:* Raratonga, Cook Islands.


**Dacus tongensis** Froggatt.

(Tonga Fruit Fly. Trypetidae; Diptera.)

*Host:* Mango.

*Injury:* Bred from mangos imported into New Zealand.

*Description:* Adult female length 9 mm.; head dull yellow; thorax black, no yellow on shoulders; wings hyaline, nervures chocolate brown; abdomen black, elongate, oval; legs light yellow, sometimes clouded at apex of femora.

*Distribution:* Tonga.


**B. IMPORTANT MANGO INSECTS.**

**HEMIPTERA.**

**Coccidae:**

*Arcebidius (Chrysomphalus) personatus* Comstock; West Indies, Mexico. (See Olive.)

*Arcebidius (Morganella) longispina* Morgan; Hawaii, Mauritius; scale of adult female less than 1 mm. wide, circular, flattened with reddish nipple-like exuvium.
Insects.

Coccidae—Continued.

A.  Aspidiotus (Morg.) maskelli Cockerell; Hawaii, Mauritius, Brazil; scale of female about 1 mm. in diameter, pitch black exuvia concealed and to one side.

* A.  Aspidiotus (Pseudonotaspis) articulatus Morgan; British West Indies. (See Coffee.)

A.  Aspidiotus (Pseudonotaspis) claviger Cockerell; Hawaii. (See Citrus.)

A.  Aspidiotus (Pseudonotaspis) trilobiformis Green; German East Africa, Java. (See Citrus.) (See text fig. 32.)

A.  Aspidiotus (Pseudobrevicapsa) longissima Cockerell; Mexico; scale of female 2.5 mm. long by 0.66 mm. broad, black marked with brown, ventral scale thin, white, exuvia to one side.

A.  Aspidiotus cinamasomi Newstead; Java, Ceylon; scale of adult female 1.25 mm. long, 1.75 mm. broad circular, flat, thin, opaque, white.

Chionaspis xilis Green; India; scale of adult female 2.5 mm. long, 2.5 mm. wide, white, thin, transparent.

* L.  Leucaspis indicus Marlatt; has been imported from India and is now established in certain sections of Florida. Scale of female white, elongate narrow, convex, flattened at tip; adult inclosed within swollen strongly chitinized second stage. (See plate I, fig. 1.)

* P.  Parlatoria pseudaspidotus Newstead; has been found on mangos imported from India, also reported from Singapore. Scale of female 1.5 mm. long, 1.25 mm. broad, dark brown, usually with slight apical extension.

Chionaspis (Phenacaspis) dilatata Green; Ceylon; scale of female 2 mm. in length, 1.5 mm. in breadth, snow white, opaque, with irregular raised lines on dorsal surface.

Chionaspis auricularis Cockerell; Southwest Florida; scale of female 2.5 mm. long, white, elongate pyriform and flat.

Chionaspis (Phenacaspis) natalensis Cockerell; Natal; scale of female pyriform, about 3 mm. long, white with exuviae pale orange brown, scale of male feebly tricarinate.

Unarmored—

Ceroplastes rubens Maskell; Australia, Hawaii, Japan. (See Avocado.)

Ceroplastes viasionli Signoret; Mauritius; female covered with wax and resembles C. fasti.

Coccus acuminatus Signoret; Hawaii, Ceylon; adult female 3.3-3.25 mm. in length, flat pale green, acuminated at cephalic extremity and broadly rounded posteriorly.

Coccus acutisimus Green; Ceylon; adult female 5-6 mm. long, 1-1.5 mm. broad, long and narrow; acutely pointed at each end; color varying from creamy white to deep chocolate brown in older specimens.

* Coccus mangiferae Green; West Indies, Ceylon; adult female 3-4 mm. in length, 2.5-3.5 mm. in breadth deltoid, pale yellowish green. Has been introduced into Florida and gives promise of being a serious pest.

Geococcus radicum Green; Ceylon, Hawaii; liable to be introduced on roots. Adult female inclosed in a brittle white sac, broadly fusiform, narrow at both extremities; antennae 6-jointed.

Icerya minor Green; Bengal; adult female 4-6 mm. in length, yellow, with 22 or 23 waxy patches around body and a dorsal patch of about 16.

Icerya seychellarum Westwood; Seychelles. (See Citrus.)

Phenacoccus iceryoides Green; India, Philippines; adult female usually to be found at anterior extremity of a globous ovise, margin with conspicuous fringe of white waxy tissues.

Phenacoccus mangiferae Green; Ceylon, India; female pale yellow, dorsal area covered with white mealy powder, with stout white processes on margin.

Pulvinaria fusc Hampel; Brazil.

Pulvinaria marmorata, Maskell; Hawaii; adult female reddish brown covered with thin grayish meal, ovise large, snow white, forming a mass of loose cotton.

Saissetia peidii Green; Ceylon; adult female bright red to deep brown, length 2.5-3.75 mm.

Saissetia puntilifera Green; Ceylon; adult female 3-3.75 mm. long, 2-2.5 mm. broad, irregularly oval, narrowed in front, varying from reddish green to reddish ochreous.

Vinsonia stellifera Westwood; Ceylon. (See Coffee.)

THYSANOPTERA.

* Heliothrips rubrocinctus Giard; West Indies, Ceylon, Uganda, Florida. (See Fruit.)

COLEOPTERA.

Cerambycidae.

Epicoteta luscus Fabricius; Java; bark borer.

Batocera itiana Thomson; India; bores in sapwood. (See text fig. 74.)

Brachyrididae.

Diapreca abbreviata Linnaeus; West Indies. (See Sugar cane.)

Curculionidae.

Cytorhynchus frigidus Fabricius; India; breeds in fruit.

LEPIDOPTERA.

Notodontidae.

Stauropterus alternus Walker; India, Ceylon, Java; defoliator.
INSECTS OF MANGO AND MAPLE.

DIPTERA.

Trypetidae.

Anastrepha fletcheri Wiedemann. (See Fruit.)

Dacus passiflorae Foggatt; Fiji. (See Fruit.)

Dacus persicae Rig; India. (See Fruit.)

Dacus ferrugineus Fabricius; India. (See Fruit.) (See fig. 75.)

Dacus diversus Coquillett; India. (See Fruit.)

Bactrocera tryoni Foggatt; Orient. (See Fruit.)

Bactrocera zonata Saunders; fruit fly; Solomon Islands, Ceylon, India.

Ceratitis capitata Wiedemann. (See Fruit.)

Ceratitis punicea Wiedemann; Africa.

LITERATURE.


MAPLE.

(Acer spp. Family Aceraceae.)

A large genus of trees and shrubs occurring in Europe, Asia, and America, much prized for cultivation as shade trees and valuable for lumber.

IMPORTANT MAPLE INSECTS.

ACARINA.

Eriophyidae.

Eriophyes macrolepis Nalepa; blister mite; England; attacks leaves of Acer campestre.

HEMIPTERA.

Coccidae.

Armored—

Chionaspis salicis Linnaeus; Europe; Acer campestre and A. pseudoplatanus.

Unarmored—

Eriococcus acris Signoret; Europe; Acer campestre, A. pseudoplatanus.

Lecanium aceris Curtis; Europe.

Lecanium coriill Linnaeus; Europe; Acer campestre, A. negundo, A. platanoides, A. pseudoplatanus.

Pulicococcus fusciplennis Burmeister; Europe.

Fig. 74.—Mango borer (Bactocera titana); Male. (Stebbling.)

Fig. 75.—Mango fruit fly (Dacus ferrugineus); a, Injured mango; b, adult, and c, larva. (Maxwell-Lefroy.)
COLEOPTERA.

Anobiidae.
* Xestobium rufivillosum DeGeer; Europe; bores in trunks.
* Pitilinus pectinicornis Linnaeus; Europe; bores in trunks.

Lyctyphonionidae.
* Hylecotus dermestoides Linnaeus; Germany; bores in wood.

Buprestidae.
* Agrilus viridis Linnaeus; Europe; bores in stems and branches. (See Oak.)

Scarabaeidae.
* Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; injure roots of seedlings.

Cerambycidae.
* Xylotreus domesticus Linnaeus and X. signatus Fabricius; ambrosia beetle Germany.

Lepidoptera.

Cossidae.
* Cossus cossus Linnaeus; Europe; bores in wood. (See Willow.)
* Zeuxera pyrina Linnaeus; Europe; bores in wood. (See Horse-chestnut.)

Geometridae.
* Cheimatobia brumata Linnaeus; Europe; defoliator.

Lymantridae.

Nepticulidae.
* Nepticula sericoeopsis Zeller; Germany; attacks leaves and seed.

LITERATURE.

NUSSLIN, O. Leitfaden der Forstinsektencunde, 2d ed., 1913.
HESS, R. Der Forstschutz, 1895, 1900.
LINDINGER, L. Die Schildlause (Coccidee), 1912.

MELON.

(See Cucurbits.)

MESQUITE; ALGAROBA.

(Prosopis spp. Family Leguminosé.)

Tender trees and shrubs growing in arid regions. Several species are native in the Southwestern United States. The pods are eaten by cattle.

IMPORTANT MESQUITE INSECTS.

HEMIPTERA.

Coreidae.
* Ceratopachys variabilis Dail., a sucking bug; India; sucks juices of jhand (Prosopis spicigera).

COLEOPTERA.

Bostrychidae.
* Sinoxylon crassum Lesne and S. anale Lesne; India; bores in Prosopis spicigera.

LITERATURE.

STEBBING, E. P. Indian Forest Insects, Coleoptera, 1914.
INSECTS OF MILLET, MOUNTAIN ASH, AND MOUNTAIN EBONY.

MILLET.

(Panicum miliaceum Linnaeus. Family Gramineae.)

These are numerous varieties and species of millets grown throughout the world. This species is cultivated extensively in China, Japan, and Russia. The main danger of importing pests in shipments of seed. Its pests are discussed under Grains and Grasses.

MOUNTAIN ASH; ROWAN TREE.

(Sorbus spp.)

Ornamental deciduous trees of the Northern Hemisphere, with small red berries. The berries of some species are edible, and the wood is used for tool handles and similar small articles.

IMPORTANT MOUNTAIN-ASH INSECTS.

COLEOPTERA.

Scarabaeidae.
Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; larvae injure roots of seedlings.

Curculionidae.
Magdalis barbicornis Latreille; Europe; breeds under bark.

Scolytidae, Iridae.
Scolytus mali Bechst. and S. rugulosus Ratzeburg Europe; bark beetles. Xylotherus domesticus Linnaeus; Germany; Ambrosia beetle.

LEPIDOPTERA.

Cossidae.
*Zeuzera pyrina* Linnaeus; Europe; bores in wood. (See Horse-chestnut.)

Geometridae.
Hibernia defoliaria Linnaeus; Europe; defoliator.

Lymantridae.
*Lymantria monacha* Linnaeus, *Orgyia antiqua* Linnaeus, and Porthesia similis Fuessly; Europe defoliators. (See Forest defoliators.)

Hyponomeutidae.
*Argyresthia conjugella* Zeller; Europe, Japan, British Columbia; bores in fruit. (See Apple.)

HYMENOPTERA.

Tenthredinidae.
Nematus septentrionalis Linnaeus; Europe; sawfly. Priophorus padi Linnaeus; Europe. (See Plum.)

LITERATURE.


MOUNTAIN EBONY.

(Bauhinia racemosa, etc. Family Leguminosae.)

Very showy plants of the Tropics. Many species are imported into Florida and California.

IMPORTANT BAUHINIA INSECTS.

COLEOPTERA.

Mylabridae (Bruchidae).
Caryoborus gonagra Fabricius; India; Breeds in the pods of Bauhinia racemosa.

LITERATURE.

Stebbing, E. P. Indian Forest Insects, Coleoptera, 1914.
MULBERRY.
(Morus spp. Family Moraceae.)
Trees of the temperate regions of the Old and New World. Some species produce delicious fruit, while others are cultivated for hedges or as food for silk worms.

IMPORTANT MULBERRY INSECTS.

HEMIPTERA.

Coccidae:

Unarmored—
Ceroplastes ruscii Linnaeus; Italy.
Gutrinella scrotula Fabricius; Italy.

COLEOPTERA.

Cerambycidae.
Apriona germari Hope and A. cinerea Chevrolat; India; bore in stems of Morus indica.

LEPIDOPTERA.

Geometridae.
Hemirhopala atrilineata Butler; Japan; defoliator.
ZAMACRA albofasciaria Leech; Japan; defoliator.

LITERATURE.

STEBBING, E. P. Indian Forest Insects, Coleoptera, 1914.

MUSKMELON.
(See Cucurbits.)

NARCISSUS; DAFFODIL.
(Narcissus spp. Family Amaryllidaceae.)
Flowering plants propagated from the bulbs.

NARCISSUS INSECTS.

Merodon clavipes Fabricius; * Merodon equestris Fabricius.

(Narcissus Flies. Syrphidæ; Diptera.)

Hosts: Narcissus, daffodil.
Injury: Breeds in the bulbs.
Description and biology: M. clavipes black, clothed with white, yellow, red, or black hairs. * M. equestris black or dark metallic green, similarly clad; 13 mm. long. Maggot grayish yellow, 12 mm. long.
Distribution: Europe. Have been introduced into Canada, California and New Zealand.


OAK.
(Quercus spp. Family Cupulifère.)

Valuable timber trees of the northern hemisphere. The bark of certain species yields cork, while of other species it is valuable for medicinal or tanning purposes.

A. BETTER KNOWN OAK INSECTS LIKELY TO BE IMPORTED.

* Agrilus viridis Linnaeus.

(Flat-Headed Wood Borer. Buprestidæ; Coleoptera.)

Hosts: Oak, beech, alder, aspen, linden, birch, rose, grape, maple, pine.
Injury: Bores in stems and branches of trees.
Description and biology: Beetle 5-8 mm. long, of variable color (olive green, blue green, blue, coppery, etc.), undersides black. Prothorax much broader than long, with median impression. Larva with first thoracic segment strongly broadened, body white. A generation requires two years.

Distribution: Europe (Austria, Germany). Introduced into eastern United States in roses.

Hess, Richard. Der Forstschutz, 1900, vol. 2, pp. 7, 8, figs. 2, 3.

Fig. 76.—Great oak-borer (Cerambyx cerdo): Adult and larva. (Nüsslin.)

Cerambyx cerdo Linneus

(Great Oak Borer. Cerambycidae; Coleoptera.)

Hosts: Oak, cork oak, ash, walnut.

Injury: Bores in wood. (See text fig. 76.)

Distribution: Europe, Sudan, Tunis.


Haltea quercetorum Foudr.

(Oak Flea Beetle. Chrysomelidae. Coleoptera.)

Hosts: Oak, hazel, willow, birch, tea rose, beech, alder.
Injury: Feed on foliage and buds in adult and larval stage.

Distribution: Europe (Russia, Germany).


_Cnethocampa processionala_ Linnaeus.

(Oak Procession Moth. Cnethocampidae; Lepidoptera.)

Host: Oak.

Injury: Defoliator; serious.

Description and biology: Moth, body clad with long hairs; forewings yellow gray with dark gray cross band; hindwings yellowish white with brown gray cross band. _Larva_ gray blue with dark dorsal stripe and reddish-brown smooth spots; undersides light greenish gray. Feeds at night. In the daytime the larvae wander in processions of a few files. _Pupation_ takes place in thick oval brown cocoon. _Eggs_ are laid in clusters of 100 to 200, covered with scales from the parent, and placed on smooth spots of the bark.

Distribution: Europe.


_Coleophora lutipennella_ Zell.

(Oak Bud Moth. Elachistidae; Lepidoptera.)

Host: Oaks and possibly birch.

Injury: Attacks the buds.

Description and biology: Adult, moth, wing expanse 15 mm., with front wings yellow, hind wings gray, all fringed. _Larva_, gray with black head. Attacks especially the axillary buds. _Pupates_ in a sack or case.

Distribution: Germany.


_Tortrix viridana_ Linnaeus.

(Green Oak Tortrix. Tortricidae; Lepidoptera.)

Hosts: _Quercus pedunculata, Q. sessiliflora, Castanea vulgaris._

Injury: Feeds on the buds, foliage, and inflorescence.

Description and biology: _Moth, wing expanse 18-22 mm., forewings brilliant green with yellowish border, hind wings gray._ _Larva_, dirty green, punctured with black, with black head, 15 mm. long. _Eggs_ are laid on the buds. The larva rolls the leaves, in which it feeds.

Distribution: Europe.


_Nüsslin, Otto_. Leitfaden der Forstinsektenkunde. 2d ed., 1913, pp. 403, 404, fig. 332.

B. IMPORTANT OAK INSECTS.

.HEMIPTERA.

_Aplidiidae._

_Pterochlorus exsiccator_ Altum. Stomaphis longirostris Altum, and _S. quercus_ Linnaeus, plant lice; Europe; attack the bark, especially of the roots.

_Coccideae._

Armoried—

_Aspidiotus_ (Targionia) alni Marchal; _Austria; Quercus cerris._

_Aspidiotus_ (Targionia) distincta Leonardi; Italy; _Quercus robur._ _Q. suber._

_Aspidiotus_ (Targionia) vitis Signoret; Italy, Sardinia; _Quercus macedonica_; _Q. suber._

_Aspidiotus minimus_ Leonardi; Europe; _Quercus coccifera, Q. ilex, Q. suber._

_Aspidiotus_ (Diaspidiotus) comatus Frauenfeld; Europe; _Quercus cerris, Q. lusitanica, Q. montana, Q. nigra, Q. palustris, Q. pubescens, Q. robur, Q. sessiliflora._

_Ottoxelyn salicis_ Linnaeus; Europe; _Quercus ilex, Q. robur._
Coccidae—Continued.

Un armored—

*Asterolecinum variolosum* Ratzeburg; Eastern United States, Europe; *Quercus branti*, *Q. cerris*, *Q. ilex*, *Q. macrocarpa*, *Q. palustris*, *Q. prinus*, *Q. pubescens*, *Q. robur*, *Q. sessiliflora*, *Q. tosa*, *Q. castaneifolia*, *Q. coccifera*.

*Eriococcus acerinig Signoret*: Austria; *Quercus sessiliflora*.

*Kermes bacciformis* Leonardo; Europe; *Quercus cerris*, *Q. suber*.

*Kermes bellotae* Signoret; Algeria, France; *Quercus ilex bellota*.

*Kermes cordiformis* Lindinger; Austria; *Quercus robur*.

*Kermes gibbosus* Signoret; Austria; *Quercus cerris*.

*Kermes ilicis* Linnaeus; Europe; *Quercus cocciifera*, *Q. ilex*.

*Kermes pallidus* Signoret; Europe.

*Kermes roberti* Fourcroy; Europe; *Quercus cerris*, *Q. ilex*, *Q. pedunculata*, *Q. robur*, *Q. sessiliflora*.

*Kermes vermilio* Planchon; Europe; *Quercus cocciifera*.

*Leccinum striatum* Douglas; Europe; *Quercus robur*.

*Leccinum corioli* Linnaeus; Europe; *Quercus cocciifera*, *Q. ilex*, *Q. robur*, *Q. sessiliflora*, *Q. suber*.

*Leccinum pulchrum* King; Europe.

*Nukaria pulvinata* Planchon; France, Algeria; *Quercus cocciifera*, *Q. ilex*.

*Palaeococcus fusicipennis* Burmeister; Denmark; *Quercus robur*.

*Palaeococcus viridus* Fourcroy; Europe; *Quercus pubescens*.

**COLEOPTERA.**

**Anobiidae.**

*Xestobium rufovillosum* De Geer; Europe; bores in dead wood.

*Ptilinus pratiscornis* Linnaeus; Europe; bores in the wood, injuring it for technical purposes.

**Lyctidae.**

*Lycus linearis* Goze; Europe, South America; bores in seasoned lumber, especially in sapwood, also in barrel staves.

**Bostrichidae.**

*Bostrichus expugnatus* Linnaeus; Europe; bores in lumber and barrel staves.

*Sinapsylon perforans* Schr.; Europe; bores in the branches.

**Lymexylidae.**

*Hygrotylus dermestoides* Linnaeus; Europe; bores in wood.

*Lymexylon nesole* Linnaeus; Europe; bores in the bark and wood.

**Tenebrionidae.**

*Pylla pini* Fabricius, Russia; injures the roots of seedlings.

**Scarabaeidae.**

*Exochirus mazeyoi* Ho.; India; bred from oak stem.

**Buprestidae.**


*Chrysobothris affinis* Fabricius; Europe; bores in bast and sapwood of branches and in trunks of seedlings.

*Corymbus clavatus* Fabricius, *C. fasciatus* Villers, *C. undatus* Fabricius; Europe; attack the stems and branches, especially of cork oaks.

**Elateridae.**

*Agrilus terricola* Linnaeus, *A. lineatus* Linnaeus, and *A. obscurus* Linnaeus; *Athous subfuscus* Müller; *Dolophilus marinus* Linnaeus; *Lecan marinus* Linnaeus; *Limionus xeroglossus* Olivier; *Prosternon bulbosicorne* Olivier; *Selatosomus xeneus* Linnaeus; wireworms; Europe; injurious to acorns and seedlings.

**Scarabaeidae.**

*Melolontha hippomann* Fabricius and *M. melolontha* Linnaeus; Europe; larvae injures roots of seedlings.

**Cerambycidae.**

*Callidium xeneum* De Geer; Germany; bores in wood of felled trees and lumber.

*Callamyra cerdo* Linnaeus; Europe; bores in bark and wood.

*Glytus tropicus* Panzer; Germany; bores in wood.

*Phytydeus sanguineus* Linnaeus, and *Phymatodes testaceus* Linnaeus; Germany; bore in wood of felled trees and lumber.

*Phymatodes luridus* Rossi; Germany; particularly injurious to barrel hoops and lumber.

*Lophoborus hugelz Redtenbacher; India; bores in trunks of *Quercus incana*.

*Parapharsis granulatus* Thomson; India; bores in *Quercus ilex*.

*Pristiporus corpulentus* Bates; India; probably bores in *Quercus semicarpifolia*.

*Markus unicolor* Gahan; India; bores in heartwood of *Quercus griffithii*.

*Xylothereus stebbingi* Gahan; India; bores in bast and outer sapwood of *Quercus dilatata*.

*Mesops marmoratus* Westwood; India; on *Quercus Griffiihii*. 
Brachyphrines.

*Brachypterus* lusitanicus Fabricius; Europe; attacks roots of *Quercus robur*, etc.

*Metallites* iris Olivier; Europe; breeds at the roots.

Curculionidae.

*Cucullu* nucum Linneaus (Balaninus); Europe (see Hazel). Many other spp. *Cucullu* (Balaninus).

Calendridae.

*Calandra* sculpturata Gyllenhall; India, breeds in the acorns.

Scolytidae, Ipidae.

*Anisandrus dispar* Fabricius; Europe; galleries in wood.

*Dryococilus hemichthias* Stebbing; India; bores in *Quercus dilatata* and *Q. incana*.

*Dryococilus villosis* Fabricius; Germany; galleries in bark.

*Hylineus creronatus* Fabricius; Germany; galleries in bark.

*Chryseus globulus* Stebbing; India; bark and wood of *Quercus incana*.

*Scolytus intricatus* Ratzeburg; Europe; galleries in bark.

*Xyleborus dryographus* Ratzeburg and *X. monographus* Fabricius; Europe; galleries in wood.

*Xyleborus exiguidus* Fabre; Europe; bores in staves.

Platytopidae.

*Diaplas capillarus* Sampson; India; bores in *Quercus lamellosa*.

*Diaplas impressus* Janson; India; bores in *Quercus incana*.

*Cossus campanarius* Chapuis; India; bores in *Quercus incana*.

*Platypus exiguidus* Fabricius; Europe; bores in staves.

Scolytinae Scolytus.

*Scolytus* darjeelingi Stebbing; India; tunnels timber of *Quercus lamellosa*.

Lepidoptera.

Cosidae.

*Cossus cossus* Linneaus; goat moth, Europe; bores in wood. (See Willow.)

*Zeuzera pyrina* Linneaus; Europe; bores in wood. (See Horse-chestnut.)

Geometridae.

*Anisopteryx scutellaris* Schiffermuller; Europe; feeds on foliage.

*Cheimataia brunata* Linneaus; Europe; defoliator.

*Hibernia aurantaria* Esp.; *H. defoliaria* Linneaus, and *H. marginaria* Borekh.; Germany; defoliators.

*Larentia dilutata* Borekh.; Europe; defoliator.

*Biston pomonaria* Hübner; Europe. (See Fruit.)

Tineidae.

*Tischeria complanella* Hübner and *T. simpliciella* F. R.; Germany; leaf miners.

Lasiocampidae.

*Eriogaster lanestris* Linneaus, *Lasiocampa quercus* Linneaus, and *Malacosoma neustria* Linneaus; Europe; defoliators.

Lymantriidae.

*Dagrotkura pudibunda* Linneaus, *Euproctis chrysorrhoea* Linneaus, *Lymantia monacha* Linneaus,*Ocneria detrita* Esp., *Phoracera diapor Linneaus, Porthesia similis Fueussly; Europe; defoliators. (See Forest defoliators.)

*Gazalina apara*; India; defoliates *Quercus lamellosa*.

Sesiidae.

*Sesia conopiformis* Esp. and *S. vespiformis* Linneaus; Europe; bore in trunk.

Tortricidae.

*Laspeyresia splendhana* Hübner (*Carpocephalus*); Europe; breeds in acorns. (See Chestnut.)

*Laspeyresia grossana* Haworth (*Carpocephalus*). (See Beech.)

*Noctula robusta* Treitschke; Europe. (See Gooseberry.)

Hymenoptera.

Cephalidae.

Janus cynosbati Linneaus, a wood wasp mining in shoots; Europe.

Tenthredinidae.

*Macrophya punctum-album* Linneaus; Russia; sawfly on foliage.

Literature.


NÜSSLIN, O. Leitfaden der Forstschutzkunde, 2d ed., 1913.

Hess, R. Der Forstschutz, 1888, 1900.
INSECTS OF OAK, OATS, OKRA, OLIVE.

BARGAGL, P. Rassegna Biologica Rivesofoi Europel, 1883-1887.
LINDBEGER, L. Die Schildlaus (Coccidei), 1912.

OATS.

(Avena sativa Linnaeus. Family Gramineae.)

This crop is grown in all temperate regions and also in Australia, Africa, and South America, the greater part of the world’s crop being raised in Europe. While the United States exports more oats than it imports, the latter trade is of considerable importance and there is always danger of importing pests with the grain. A full discussion of its insect pests will be found under the heading Grains and Grasses.

OKRA.

(Hibiscus esculentus. Family Malvaceae.)

A cultivated plant introduced into the United States from Africa; cultivated for its fruit pods.

IMPORTANT OKRA INSECTS.

LEPIDOPTERA.

Pyralidae.
Sylepta derogata Fabricius; Africa, Asia.

Noctuidae.
Cosmophila subulifera Guèneé; Africa, Asia, Hawaii.

COLEOPTERA.

Chrysomelidae.
Diabrotica graminea Ballou; Porto Rico.

OLIVE.

(Olea spp. Family Oleaceae.)

Fruit bearing trees or shrubs of the tropical and warm temperate parts of the old world to New Zealand. Olea europaea produces the olive prized as a fruit and for its oil. It is cultivated in California and New Mexico.

A. BETTER KNOWN OLIVE INSECTS LIKELY TO BE IMPORTED.

Aleurolobus olivinus Silvestri.

(Host: Olive. Aleyrodidae; Hemiptera.)

Injury: Feeds on foliage, ordinarily not serious.

Description and biology: Adult, male body cream-colored or whitish ochre; body and wings sprinkled with a white waxy powder, forewings exhibit fulvous spots. Pupa case, length somewhat exceeding width; dorsum black, margin marked with a fringe of wax. Egg reticulated subelliptical, attached by a short pedicel; pale straw in color when first deposited, subsequently turning to brown. One generation a year.

Distribution: Italy.

Silvestri, F. Dispense di Entomologia Agraria, 1911, p. 128.

Prays oleellus Fabricius.

(Host: Olives. Hyponomeutidae; Lepidoptera.)

Injury: Serious.

Description and biology: Adult, moth 6-6.5 mm, long, gray with silvery reflection, a black spot on the apex of the scutellum; front wings gray with silvery reflection,
and with several black or dark spots; hind wings uniformly gray. *Pupa* obconical 5 mm. long in elongate silken cocoon. *Larva* when full grown, dusky color with two olivaceous stripes on the dorsum. In the first generation feeds on the leaves; in the next among the buds and blooms; and in the last in the fruit.

**Distribution:** France, Italy, Spain.


Dacus oleae Rosl.

(The Olive Fly. Trypetidæ; Diptera.)

*Host:* Olive (*Olea europaea, O. verrucosa, O. chrysophylla.*)

*Injury:* Serious pest of olive in Mediterranean regions.

*Description and biology:* Adult, female small, about 5 mm. in length; head dull yellow, eyes black, thorax black with silvery pubescence on dorsal surface forming three parallel black lines; abdomen black, covered with a scattered gray pubescence. The egg, larval, and usually the pupal stages are passed in the fruit. Occasionally pupation takes place in the soil. Larvae hatch in from 2 to 4 days after deposition of the eggs; larval stage lasts approximately 10 to 13 days; pupal stage 13 to 49 days, depending upon the season.

**Distribution:** Sicily, Italy, north, east, and south Africa, Canary Islands, Mediterranean region, northern and western Asia, Himalayas, India.


### B. IMPORTANT OLIVE INSECTS.

**HEMIPTERA.**

*Coccidæ.*

Armored—

*Aespidotus* (Chrysophthalmus) nigropunctatus Cockerell; Chili, Mexico; adult female scale 3 mm. in diameter, dirty gray; exuvia pitch black with narrow reddish margin.

*Aespidotus* (Chrysophthalmus) personatus Cockerell; Jamaica; adult female scale very small, convex, circular, dark gray or black.

*Aspidiotus* (Pseudaonidia) articulatus Morgan; Jamaica. (See Coffee.)

*Aespidiotus* (Pseudaonidia) duplex Cockerell; Italy; on *Olea fragrans*; adult female scale 2.66 mm. in diameter, subcircular, moderately convex, dark, blackish brown, exuvia to one side and of orange color.

*Aespidotus* (Aonidia) oleae Leonard; Africa.

*Lepidosaphes* olivæa Leonard; Africa.

*Chionaspis* (Phenocaspis) bispuriæ Cockerell; Tunisia.

*Chionaspis* nipponensis Newstead; Algeria.

*Diaspis* olivæ Coblæe; Spain.

*Florinia* theca Green; India; adult female scale elongate, narrow, dark brown with distinct dark median marking. Male scale snow white indistinctly tricornate (see pl. V, fig. 1).

*Leucaspis ricci* Targioni-Tozzetti; France, Greece, Algeria, Italy; adult female scale 2.25 mm. long, 0.5 mm. broad, narrow, white, with sides parallel.

*Parlatoria* affinis Newstead; Algeria; adult female scale 1.6-2.25 mm. in diameter, when isolated circular dusky white or pale ochreous.

*Parlatoria* colianthina Berlese and Leonardi; Italy and Algeria; adult female scale 2.3 mm. long, 2.6 mm. broad, white, dorsal exuvia subcentral.

Unarmored—

*Ceroplastes* ruscii Linnaeus; Italy; adult female covered with wax, antenna 6-jointed.

*Euhypoplia* olivæa Berlese and Silvestri; Italy.

*Piliphis* oleæ Costa; Italy, Algeria; adult female forms a white sac in the foliage.

*Lichtenstein* estoni Newstead; Algeria; adult female inclosed in a felted sac; adult male scale glossy white with strong central keel.

*Pollinia* pollini Costa; Italy; adult female scale pale yellow to brown, smooth head, convex, with median curled flossy like filaments on the dorsum.

**Thysanoptera.**

*Phloeothripidæ.*

*Phloeothrips* oleæ Costa; Algiers, Italy, South America; attacks leaves, bloom, and fruit, and is an important pest in Italy according to Trabut.
INSECTS OF OLIVE AND ONION.

COLEOPTERA.

Cerambycidae.
Vesperus mauretanicus Dry.; Algeria, Spain. (See Grape.)

Curculionidae.
Clonus razini De Geer; Europe; breeds on leaves.

Ipsida.
Phloeostictus ote Fabricius; bark beetle; Southern Europe; Tunis; in nursery stock.
Hyteleus fraxinif Fabricius and H. ote Fabricius; Europe; breed in bark and wood.
Hyteleus vestitus M. and R.; bark beetle; Tunis, Corsica, Italy, Southern France; in Pistacia and olive.

LEPIDOPTERA.

(Cerataetidae.
Leporinus fraxini Fabricius; Europe; infests fruit.

LITERATURE.
Trabut, L. La Defense Contre les Cochenilles, 1910, p. 88.

ONION; SHALLOT; LEEK; GARLIC.

(Alliuum spp. Liliaceae.)
Bulbous root plants native of Asia domesticated for centuries and developed into many valuable varieties.

A. BETTER KNOWN ONION INSECTS LIKELY TO BE IMPORTED.

Chortophila eliterura Rondani.
(Shallot Fly. Anthomyidae; Diptera.)
Hosts: Alliuum spp. (including shallot), asparagus, human excrement.
Injury: Breeds in the plant stems.
Description and biology: Male fly gray, with three brown stripes on scutellum, abdomen with deep black median stripe and brown segments; appendages black. Female lighter; length 4.5 mm. Maggot dirty white, with 14 teeth on apical margin of stigmal plate.
Distribution: Europe.


* Hyilemyla antiqua Meigen.
(Onion Maggot. Anthomyidae; Diptera.)
Host: Onions.
Injury: Serious injury to the roots.
Description and biology: Fly black, thickly dusted with gray, with dark flecks and stripes; legs piceous black; length 6.5 mm. Maggot yellowish, 5–6 mm. long.
Distribution: Europe. Introduced into United States.


Smith, J. B. New Jersey Exp. Sta. 1907, Bul. 200, pp. 10–15, figs. 1, 8, 11.

* Eumerus strigatus Fabricius.
(Onion Fly. Syrphidae; Diptera.)
Host: Onions, Iris.
Injury: Breeds in the stems and bulbs.
Description and biology: Fly green; abdomen with gray hairy lunules at apex and at sides of the first three segments; antennae dark; length 6–7.5 mm. Maggot grayish yellow. Pupa sometimes in soil, sometimes in flower shaft.
Distribution: Europe. Reported present in this country, by Felt, from Iris roots at Saratoga Springs, N. Y.

B. IMPORTANT ONION INSECTS.

COLEOPTERA.

Curculionidae.

* Hyponcra nigrocutris Fabricius, H. ononidis Chevrolat; Europe. (See Clover.)

Brachycecidiae.

* Brachycerus albojunctus Gyllenhal; Europe; breeds in roots of Allium sativum and A. ascalonicum.
* Brachycerus coroicus Gyllenhal; Europe; breeds in roots of Allium roseum.
* Brachycerus pradieri Fairmaire; Europe; breeds in roots of Allium spherocephalum.
* Brachycerus undatus Fabricius; breeds in roots of Allium roseum.

ORACHE.

*(Atriplex hortensis. Family Chenopodiaceae.)*

Plants cultivated for their succulent vegetation.

IMPORTANT ORACHE INSECTS.

COLEOPTERA.

Chrysomelidae.

*Cassida nebulosa Linneaus. (See Beet.)*

DIPTERA.

* Chortophila (Pegomya) hyoscyami Panzer. (See Beet.)

ORCHIDS.

*(Family Orchidaceae.)*

Many species of orchids are imported by florists from all parts of the tropical and semitropical regions. Several important pests have been taken in quarantine.

IMPORTANT ORCHID INSECTS.

ACARINA.

* Tyroglyphidae. (Coepophagus) echinopus F. & R. (See Potato.)*

HEMIPTERA.

Coccidae.

* Armored—
  * Aspidiotus (Chrysomphalus) persicus Comstock; Central America.
  * Aspidiotus (Chrysomphalus) portoricensis Lindinger; Venezuela.
  * Aspidiotus (Diaspidiotus) coloratus Cockerell; Guatemala.
  * Aspidiotus (Pseudococcus) articularis Morgan; Mexico.
  * Aspidiotus (Targionia) biformis Cockerell; Trinidad, Venezuela, Grenada, Central America, Jamaica, Antigua, Colombia.
  * Aspidiotus (Targionia) biformis var. cattleya Cockerell; Jamaica.
  * Diaspis cattleya Cockerell; Mexico, England.
  * Florinia stricta Maskell; New Zealand.
  * Pseudococcus oceana Lindinger; Venezuela.
  * Lepidosaphes cocculi Green; Philippine Islands.
  * Lepidosaphes pallida Green; Java.
  * Parlatoria mytilaspifurmis Green; Hawaii.
  * Parlatoria proteus Curtis; India, Brazil, Japan, Philippine Islands, Burma, United States.
  * Parlatoria pseudospadix Lindinger; India, Philippine Islands, Singapore. Has been introduced into the United States on mangos.
  * Pinnaspis longula Leonardi; Straits Settlements.

* Unarmored—
  * Asterolecanium ornatum Boisdruat; Ceylon, West Indies.
  * Asterolecanium epidendri Bouché; Central America, South America, Samoa.
  * Coccus acuminatus Signoret; Hawaii.
  * Coccus minimus Newstead; Straits Settlements.
  * Pseudococcus glaucus Maskell; New Zealand.
  * Pulvinaria flocilfera Westwood; Venezuela, British Isles, Massachusetts, Indiana, California.
LEPIDOPTERA.

Castniidae.

Castnia lietus Drury; South America. (See Sugar cane.)

COLEOPTERA.

Curculionidae.

* Cholus forbesi Pascoe, and * Cholus cattleyæ Champion have been introduced on orchids.

PALMS.

The palms yield some very important articles of commerce, such as coconuts and dates, and are also considered very valuable as ornamental plants.

For convenience the pests of the coconut palm (Cocos nucifera), the date palm (Phoenix dactylifera), the royal palm (Oreodoxa regia), the sago palm (Cycas revoluta), and the toddy palm (Phcenix sylvestris) are treated under this heading.

A. BETTER KNOWN PALM INSECTS LIKELY TO BE IMPORTED.

Aleurodicus destructor Mackie.

*Host:* Coconut palms.

*Injury:* Has the appearance of being a serious coconut enemy.

*Biology:* Eggs are laid on undersurface of the leaflets, where the young larvae locate. Life history much the same as Dialeurodïes citrï R. and H. (See Citrus.) (See text fig. 77.)

*Distribution:* Philippines.


Levuana iridescens Bethune-Baker.

*(The Coconut Leaf Moth. Zygænidæ; Lepidoptera.)*

*Hosts:* Coconut palm and royal palm (Oreodoxa regia).

*Injury:* Larvae injurious to foliage, giving the trees a sickly appearance.

*Description and biology:* Adult female, head and thorax steel-blue; abdomen and legs ochrous, primary veins deep unicolorous steel-blue, secondaries iridescent steel-blue; wing expanse about 16 mm. Eggs deposited on under surface of leaflets, usually near the base. Upon hatching, which requires about 4 or 5 days, the larvae begin feeding around the egg shell, gradually proceeding in a longitudinal line up the leaf, nibbling on the epidermal cells on the under surface of the leaflet; are full grown in 3 or 4 weeks, when they return to the base of the leaves and construct a white cocoon within which to pupate; the adults appear in about 7 days.

*Distribution:* Fiji.

Oryctes rhinoceros Linnaeus.

(Rhinoceros Beetle. Scarabaeidae; Coleoptera.)

Hosts: Palm, aloes, sugar cane (occasionally).

Injury: Destructive to coconut palm in Malacca, Singapore, and Madras. May be introduced in plants.

Description and biology: Adult beetle large thickest, about 5 cm. long; and 25 mm. broad; color dark brown to black. The adults feed upon the soft tissues and unopened leaves of palms. Larve are found in decomposed vegetable matter and soil rich in humus about plant roots. Pupa is inclosed in hard case. The eggs are white but become dull with age; measure 3.5 mm. by 2 mm.; oval.

Distribution: Ceylon, India, Siam, Annam, Pahang, Sumatra, Java, Celebes, Ceram, Amboina, Philippine Islands, Formosa, Korea, China, Straits Settlements, Tahiti, Madras, Malabar.


Promecotheca cunningii Baly.

Host: Coconut (Cocos nucifera).

Injury: Mines the leaves in larval stage; adults also feed on leaves. May be introduced in leaves of nursery stock.

Description and biology: Adult beetle 7.5–10 mm. long and 1.6–2 mm. wide, general color, brown ocher; head small, elytral stripe finely punctate. Eggs deposited singly on underside of leaflets in a small hole made by the adult; entire larval and pupal periods spent in the leaf between the lower and upper epidermis. More injury is occasioned by the larva than by the adult. Tissues which have been attacked soon become brown and die. Egg stage about 32 days, and pupal stage about 7.5 days.

Distribution: Philippine Islands.

Jones, Chas. R. The Philippine Agric. Review, 1913, vol. 6, No. 5, p. 228.

Promecotheca reichei.

(Conoconut Leaf Miner. Hispidae; Coleoptera.)

Host: Coconut palm.

Injury: Damage occasioned by the pest is usually local, but affected trees appear brown and unhealthy when viewed from a distance.

Description and biology: Adult beetle length 8 mm., breadth 2 mm.; general color golden; head quadrangular in shape and provided with powerful mandibles; thorax golden, basal third of elytra golden and remainder metallic blue. Eggs are deposited singly on under surface of leaflets; larve on hatching make their way into the leaf and tunnel between the upper and lower surfaces, feeding on the fleshy cells; pupate usually at extreme end of tunnel passage; pupal stage lasts from 18 to 20 days.

Distribution: Fiji.


Brontispa froggatti Sharp.

(The Leaf Hispa. Hispidae; Coleoptera.)

Host: Coconut palm.

Injury: Very injurious to young coconut groves in Solomon Islands. Liable to be imported on growing plants.
A PALM WEEVIL.

The palm weevil (Rhynchophorus palmarum): 1 a-d, Adult; 2 a-c, larva; 3 a, b, pupa; 4, cocoon. (Blandford.)
The Palm Scale.

*The palm scale (Phoenicoecus marlatti). (Original, Sasscer)
Description and biology: Adult beetle about 12 mm. long from tip of antennae to tip of abdomen, shining black, head small, antennae 11-jointed, thorax almost square, slightly hollowed on sides. Eggs deposited in the folds of the opening fronds. Larvae feed on surface of leaf and the adult also injures the foliage.

Distribution: New Britain and Solomon Islands.


Rhynchophorus ferrugineus Fabricius (signaticollis Chevrolat).

Hosts: Coconut palm (Cocos nucifera), toddy palm (Phoenix sylvestris), and date palm (Phoenix dactylifera).

Injury: Destructive to palms in India, Straits Settlements, and Ceylon. LIABLE to be introduced in plants.

Description and biology: Adult weevil, brown with conspicuous curved beak; about 37 mm. long. Eggs laid singly in tissues of palm tree. Larvae on hatching tunnel in the soft tissues, gradually working into the stem; pupate in a cocoon of twisted fibers within the plant. (See text fig. 78.)

Distribution: India, Ceylon, Straits Settlements, Andaman Islands, Persian Gulf, Philippine Islands.


Stebbing, E. P. Indian Forest Pests, Coleoptera, 1914, pp. 444, 445; figs. 292, 293.


Rhynchophorus palmarum Linnaeus.

(The Palm Weevil. Calendridae; Coleoptera.)

Hosts: Palm and sugar cane.

Injury: Reported to be very serious in British Honduras.

Description and biology: A very large reddish weevil. Eggs are deposited in tissues of food plant; larva spends entire existence as a borer, and when full grown pupates in a rough cocoon constructed of fibers without leaving the plant. (See plate xxxi.)

Distribution: British Honduras, Trinidad, Lesser Antilles, Brazil, Cayenne, Surinam, and possibly generally distributed over tropical coast of South America and Central America.
A MANUAL OF DANGEROUS INSECTS.


B. OTHER IMPORTANT PALM INSECTS.

HEMIPTERA.

Coccidae.

Armored—

Aspidiotus panoensis D. & F.; Samoa; coconut husks.
Aspidiotus (Pseudococcus) articulatus Morgan; Brazil, West Africa, Venezuela, Mexico; coconut. (See Coffee.)
Aspidiotus (Pseudococcus) trilobiformis Green; West Africa, German East Africa, Japan, Venezuela, Brazil; coconut, sago palm. (See text fig. 32.)
Aspidiotus (Pseudococcus) linearis Hempel; Brazil.
Aspidiotus (Hemiberlesia) palmæ Morgan and Cockerell; East and West Africa, West Indies, Azores, Brazil; coconut.
Aspidiotus (Hemiberlesia) similiminus Cockerell; Australia.

*Aspidiotus (Chrysomphalus) persiæ Comstock; Florida, Mexico, Brazil; coconut. (See Avocado.)
Aspidiotus (Chrysomphalus) personatus Comstock; British Guiana, Porto Rico, Mexico; coconut. (See Olive.)
Aspidiotus (Chrysomphalus) propinquus Banks; Philippines.
Aspidiotus (Chrysomphalus) scutiformis Cockerell; Central America.
Aspidiotus (Chrysomphalus) ansei Green; Seychelles; Cocos nucifera.
Aspidiotus fissiculca var. pluridentatus Lindinger; German East Africa.
Aspidiotus (Diaspidiotus) orientalis Newstead; German East Africa.
Aspidiotus spinosus Comstock; Italy, German East Africa, Brazil.
Aspidiotus varians Lindinger; German East Africa, Madagascar.
Chionaspis inday Banks; Philippines.
Chionaspis substratæ Newstead; Uganda, British East Africa.
Chionaspis samoana D. & F.; Samoa.
Cryptaspis nucum Lindinger; Madagascar.

*Diaspis zamãe Morgan; Germany, Colorado, Wisconsin (in greenhouses), Italy.
Furcaspis oceanica Lindinger; Caroline Islands.
Lepidosaphes megapagi Banks; Philippines.
Lepidosaphes unicolor Banks; Philippines.
Lepidosaphes duponti Green; Seychelles; Cocos nucifera.
Leucospis sp. cockerelli de Charmoni; Germany East Africa, Brazil, Venezuela.
Parlatoria blanchardi Targioni-Tozzetti; Australia, Algeria, Sahara, Egypt, Arabia; date palm. (See pl. 5, fig. 3.)

Parlatoria greeni Banks; Philippines.

*Parlatoria protæus Curtis; Brazil, Jamaica, Australia.
Parlatoria mythiaspiformis Green.
Chionaspis (Phenacaspis) cockerelli Cooley; China; sago palm.
Chionaspis (Phenacaspis) dilatata Green; India. (See Mango.)
Pinnaspis bœzi Bouche; British Guiana, Trinidad, West Indies, Toboland, German East Africa; coconut. (See Betel nut.)

*Poliaspis eyéaddii Comstock.

Unarmored—

Asterolecanium coerferum Green; Ceylon.
Asterolecanium lineare Lindinger; Brazil.
Asterolecanium palmae Cockerell.
Asterolecanium urichi Cockerell.
Asterolecanium allii Green; Australia; Livistona hunnatis.
Croplastes actiniformis Green; Ceylon.
Croplastes myricæ Linnæus; South Africa, India, Europe (in greenhouses).
Croplastes rabens Maskell; Australia, Hawaii, Japan.
Coccus hecspertidæ Linnæus; cosmopolitan; tea, citrus, palms (see pl. 11, fig. 4).
Coccus acutilimulus Green; Ceylon; coconut, sago.
Dactylobalis coccus Costa; Canary Islands.
Halimococcus lampas Cockerell.
Icerya montserratensis Riley and Howard; West Indies, Grenada, Mexico. (See Citrus.)
Icerya seychellorum Westwood. (See Citrus.)
Lecanium pseudexypactus Green; Australia; Pandanus odoratissimus,
Paralecanium coccophytes Banks; Philippines.

*Pheneicococcus marlattii Cockerell; Algeria, Egypt, Sahara; date palm. (See pl. XXXII.)
**INSECTS OF PALM, PANAMA RUBBER, PAPAYA.**

163

Coccidae—Continued.
Unarmored—Continued.

*Coccoccus cocos* Maskell; Guam.
*Coccoccus dubia* Newstead; Barbados, Grenada.
*Coccoccus pandani* Cockerell; Fiji; coconut.
*Coccoccus virgatus* Cockerell; Jamaica, Mexico; coconut.
*Ehizococcus falcifer* Künzkel; Algeria, Sicily.
*Ehizococcus piceus* (Newstead; London (greenhouse).
*Rhipicephalos palmarum* Elton; Hawaii; *Cocos nucifera*, *Areca lutescens*.

**COLEOPTERA.**

Calendridae.

*Rhabdocenemis obscurus* Boisduval; Hawaii, etc. (See Sugar Cane.)

**LEPIDOPTERA.**

Pyralidae.


Lycænidae.

*Virochola livia* Klug; Egypt; breeds in dates (Gough, l. c., p. 103)

**PANAMA RUBBER.**

*(Castilloa elastica.* Family Moraceae.)

African, Mexican, and Central American trees yielding rubber.

A PANAMA-RUBBER INSECT LIKELY TO BE IMPORTED.

*Inesida leprosa* Fabricius.

(Castilloa Borer. Cerambycidae; Coleoptera.)

Host: Panama rubber *(Castilloa elastica).*

Injury: Very serious borer. In West Africa it has almost ruined *Castilloa* culture.

Description and biology: Beetle brown, venter and greater part of elytra covered with yellowish brown scales; a black triangle on lateral margin of each elytron beyond middle; humeri of elytra strong and coarsely punctured; length 25-35 mm. Larva 5 cm. long, with large clypeus. Eggs laid at base of trunk. Pupates in larval tunnel.

Distribution: West and East Africa.


**PAPAYA.**

*(Carica papaya.* Family Passifloraceae.)

A tropical fruit-bearing tree grown in Florida.

**IMPORTANT PAPAYA INSECTS.**

**HEMIPTERA.**

Aspidiotus destructor Signoret; Amani, Africa.

**COLEOPTERA.**

Calendridae.

*Rhabdocenemis obscurus* Boisduval. (See Sugar cane.)

**DIPTERA.**

Trypetidae.

*Ceratitis capitata* Wiedemann; attacks *Carica papaya* and *C. quercifolia.* (See Fruit.)

PARA PLUM.
(Spondias spp. Family Anacardiaceae.)

AN IMPORTANT PARA-PLUM INSECT.

DIPTERA.

Trypetidae.
Anastrepha fraterculus Wiedemann. (See Fruit.)

PARA RUBBER.
(Hevea brasiliensis Muell. Family Euphorbiaceae.)

This tree produces the Para rubber of commerce, or caoutchouc. It grows in Brazil and Guiana, and attempts have been made to grow it in Florida.

IMPORTANT PARA-RUBBER INSECT.

ISOPTERA.

Termiitidae.
Coptotermes gestroi Wasmann, white ant; India; destroys the roots.

PARSLEY.
(Carum petroselinum. Family Umbelliferae.)

An herb cultivated for its foliage, much used as a garnish.

AN IMPORTANT PARSLEY INSECT.

LEPIDOPTERA.

Pyralidae.
* Pheona ferrugalis Hübner; Europe, Asia, North America. (See Cabbage.)

PARSNIP.
(Pastinaca sativa Linnaeus. Family Umbelliferae.)

The parsnip is grown in Europe and America, and, being a root crop, is liable at any time to introduce root pests.

IMPORTANT PARSNIP INSECTS.

ACARINA.

Tyroglyphidae.
* Rhizoeglyphus (Coepophagus) chinopus F. and R. (See Potato.)

LEPIDOPTERA.

Gelechiidae.
Depressaria nervosa Hiw. and D. depressella Hübner; Europe; attack buds and flower heads.

DIPTERA.

Agronomyzidae.
Phyponyx affinis Fallen. (See Tobacco.)

Trypetidae.
Achlys heraclei Linnaeus; Europe. (See Celery.)

PEA.
(Pisum sativum. Family Leguminose.)

The various varieties of peas are grown extensively in Europe and America. Some of the pests of the peas, such as the weevils, have been very widely distributed by commerce. (See Bean.)
A. BETTER KNOWN PEA INSECTS LIKELY TO BE IMPORTED.

* Etiella zinckenella Treitschke.

( Pea Pod Borer. Pyralidae; Lepidoptera. )

Hosts: Peas, bean, Sann hemp (Crotalaria).

Injury: Breeds in the pods.

Description and biology: Adult, moth with wing expanse 18-30 mm., pale rufous; forewings gray brown, with white marginal fascia and a transverse rufous bar, hind-wing with brown suffusions and lines. Pupa in spindleform cocoon. Larva bores in the pods of legumes.

Distribution: Europe, Africa, Asia, West Indies, California, Colorado, Texas, Florida, Oklahoma, nearly cosmopolitan.


Laspeyresia (Grapholitha) spp.

( Pea Moths. Tortricidae; Lepidoptera. )

Species: L. dorsana Fabricius; Europe; peas, beans, Orobus tuberosus, and Trifolium pratense. L. nebritana Treitschke; Sudan; lentils, field peas, wild legumes. *L. nigricana Stephens; Europe and Canada since 1893; peas.

Injury: Bore in the pods.

Description and biology: Moths, brownish; dorsana with crescentiform white spots on forewings; nigricana a little smaller than nebritana, the latter with two curved lines near tip on each forewing. Larvae bore in pods.


Contarinia pisi Winn.

( Pea Midge. Itonididae [Cecidomyiidae]; Diptera. )

Hosts: Pea.

Injury: Breeds in the hulls of peas, impairing or destroying the yield.

Description: Midge, yellow, thorax banded with brown, antennae black; length 2 mm. Maggot white, 3 mm. long.

Distribution: Europe.


B. OTHER IMPORTANT PEA INSECTS.

HEMIPTERA.

Aphididae.

* Macrosiphum pisi Kaltenbach.

COLEOPTERA.

Elateridae.

Agriontes lineatus Linnaeus. (See Tobacco.)

Mylabridae (Bruchidae).


Curculionidae.

Sitona lineata Linnaeus, * S. flavescens Marsh, and * S. hispidula Fabricius; Europe. (See Clover.)

LEPIDOPTERA.

Lycæidae.

Zizura labradus Godt.; Australia; attacks pods. (See Beans.)

DIPTERA.

Agromyzidae.

Phytomyza affinis Fallen. (See Tobacco.)
PEACH; ALMOND.

(Amygdalus spp. Family Rosaceæ.)

Delicious fruit-bearing trees of temperate and warm climates. The almond pit is much sold as a nut.

A. BETTER KNOWN PEACH INSECTS LIKELY TO BE IMPORTED.

Uracanthus acutus Blackburn. (Cerambycidae; Coleoptera.)

*Hosts:* Peach, apricot, plum.

*Description and biology:* Adult, length about 14 mm.; color obscure ferruginous; covered with short pubescence.

*Distribution:* Australia.


Conogethes punctiferalis Guérin. (Northern Peach Moth. Pyralidae; Lepidoptera.)

*Host:* Peach.

*Injury:* Infests the fruit.


*Distribution:* Australia.


B. OTHER IMPORTANT PEACH INSECTS.

HEMIPTERA.

Coccidae.

Armored—

Aspidiotus (Pseudaonidia) clavigera Cockerell; Hawaii.

Aspidiotus (Diaspidiotus) ostreaformis Curtis; British Isles.

Diaspis leperti Signoret; Europe.

Diaspis squamosus Newstead and Theobald; Egypt.

Epidiaspis piriola Del Guercio; Europe.

Parlatoria affinis Newstead; Algeria.

Parlatoria callanthina Berlese and Leonardi; Algeria, Italy.

Pseudoparlatoria parlatorioides (Comstock); Brazil, Mexico.

Unarmored—

Lecanium kunonis Kuwana; China.

Lecanium persicæ (Fabricius); Europe.

Lecanium rugosum Signoret; France, Germany.

Lecanium vini Bouché; Europe.

Lygidae.

Nysius vinitor Bergroth; Australia. (See Fruit.)

COLEOPTERA.

Elateridae.

Agriotes lineatus Linnaeus. (See Tobacco.)

Bostrychidae.

Apate monacchus Fabricius; Africa, West Indies, attacks almond. (See Citrus.)

Chrysomelidae.

Aulacophora olivieri Guérin, leaf beetle; Australia. (See Cucurbits.)
INSECTS OF PEACH AND PEAR.

Brachyrhinidae.
- *Brachyrhinus ligustici* Linnaeus; Europe. (See Grape.)
- *Brachyrhinus corruptor* Host; Italy; attacks almond. (See Grape.)

Scolytidae.
- *Scolytus amygdali* Guérin; Mediterranean region; bark beetle in almond and apricot trees, very injurious.

LEPIDOPTERA.

Xyloryctidae.
- *Cryptophaga unipunctata* Donovan; Australia. (See Plum, Cherry.)

Pyralidae.
- *Dichocotis punctiferalis* Guène; Queensland. (See Corn.)

DIPTERA.

Trypetidae.
- *Ceratitis capitata* Wiedemann, attacks peach and almond. (See Fruit.)
- *Anastrepha ludens* Loew; Mexico. (See Fruit.)
- *Dacus diversus* Coquillett; India. (See Fruit.)
- *Dacus persicx* Rtg.; India. (See Fruit.)
- *Bactrocera tryoni* Froggatt; Orient. (See Fruit.)

PEAR.

(Pyrus communis, etc. Family Rosaceae.)

Fruit trees native of south-central Europe and Asia and much cultivated in this country for their delicious fruits.

A. BETTER KNOWN PEAR INSECTS LIKELY TO BE IMPORTED.

*Psylla pyrisuga* Förster.

(The Large Pear Psylla. Psyllidae; Hemiptera.)

*Host:* Pear.

*Injury:* Quite injurious in middle Europe and Japan.

*Description and biology:* Adult marked with black and red, wings yellow. Female about 3.5 mm. and male 2.5 mm. in length. Winters in adult condition under bark scales of the trees. Eggs are laid singly or in small groups in hairs of leaf and flower stems or on leaves. Nymph is dark yellow in color, with waxy secretion. The foliage is distorted and leaves rolled up; also the young branches are killed and young fruit destroyed.

*Distribution:* Europe, Japan.


*Stephanitis pyri* Fabricius.

(The Pear Tingis. Tingitidae; Hemiptera.)

*Hosts:* Pear, apple.

*Injury:* Serious pest to pear and apple in Europe.

*Description and biology:* Adult, about 3 mm. long; body flat and covered with relatively large wings of a beautiful lace network; lobes of same pattern extend from each side of prothorax; general color brownish, with dark bands across wings. Nymph oval in outline, pale greenish in color and abdominal segments each with a spine on each side; two transverse dusky bands on bodies of older individuals. Eggs ovate, oblong, greenish white in color, 0.6 mm. long. Adults winter around base of host plants, reproducing in spring on under surface of leaves, where all stages may
be found at the same time during summer. Badly infested leaves become yellow, then brown, and die. (See text fig. 79.)

Distribution: Europe.

Costa, Achille. Insetti nocivi all'Agricoltura, 1879, p. 166.
Silvestri, F. Dispense di Entomologica Agraria, 1911, p. 82.

Nephoteryx rubrizonella Ragonot.

(Pear Fruit Borer. Pyralidæ; Lepidoptera.)

Host: Pear.

Injury: Destroys yearly 30 to 40 per cent of fruit.

Description and biology: Adult, wing expanse 25 mm. Forewing grayish brown to grayish black, crossed by two equidistant irregularly pinnated grayish-bordered black lines; outer margin and basal half much deeper in color; hindwing dark gray; thorax colored like forewing, abdomen paler. Two brooded; first occurs in July, second in September and October. Pupa, deep reddish brown. Pupates in core of fruit. Larva, length 20 mm.; spindle-shaped, color pinkish brown; attacks core of fruit. Stage lasts three weeks or more. Eggs, deposited on lower surface of twigs, about 20 in a mass, covered by a white silk web.

Distribution: Japan.


Dasyneura pyri Bouché.

(Pear Leaf-Curling Midge. Itonidæ [Cecidomyiidae]; Diptera.)

Host: Pear.

Injury: Rolls edges of leaves.

Description and biology: Adult, length 2 mm. Brown, with limpid wings and tawny palpi. Occurs in spring. Pupates in the soil. Whitish maggots.

Distribution: Europe.

**Janus compressus** Fabricius.

(The Bud-stinger. Tenthredinidae; Hymenoptera.)

*Host:* Pear.

*Injury:* Hollows out medullary canal in twigs.

*Description and biology:* Adult male, length 7 mm.; color black, with a transverse yellow band on thorax; abdomen entirely yellow; female 8 mm.; blackish, with three yellow spots on thorax and circle of red on abdomen. Occurs in May. One generation. *Pupates* in spring in gallery in shoot. *Larva*, length 6 mm.; white; makes gallery in twig. Winters in this stage in lower part of gallery. *Eggs* placed in buds.

*Distribution:* Europe.

**GENAUX, G.** Entomologie et Parasitologie Agricoles, 1904, p. 304.

**MUTILLOT, L.** Les Insectes Nuisibles, 1891, p. 189.

**Pamphilus flaviventris** Retz.

(Social Pear Sawfly. Tenthredinidae; Hymenoptera.)

*Hosts:* Pear, plum, cherry, white thorn, and other rosaceous plants.

*Injury:* Considerable damage. Strips foliage from trees.

*Description and biology:* Adult, female, black; antennae and legs yellowish; abdomen tawny at apex, with yellow triangular mark on sides of segments; ventrally bands of yellow; male, abdomen reddish yellow from second segment to apex; lower part of head yellow; wing expanse 8–12 mm. *Pupates* in cocoon in soil. *Larva*, length 25 mm.; orange yellow; head black; two black spots on second segment; has no prolegs; spins tent over leaves on which it feeds; winters in cocoon; may suspend development and remain in soil over a second winter. *Eggs* are deposited on under surface of leaves in groups of 30 to 60. Incubation requires 6 or 7 days.

*Distribution:* Europe.

**THEOBALD, F. V.** Insect Pests of Fruit, 1909, p. 338.

**IMPORTANT PEAR INSECTS.**

**HEMIPTERA.**

**Coccidae.**

Armored—

*Aspidiotus* (*Diaspidiotus*) *africanus* Marlatt; Africa.

*Aspidiotus* (*Aonidia*) *lauri* Bouché; Germany.

*Aspidiotus* (*Diaspidiotus*) *ostreformis* Curtis; Europe, Canada.

*Aspidiotus* *pectinatus* Lindinger; South Africa.

*Aspidiotus* (*Diaspidiotus*) *pgr* Lichtenstein; France, Switzerland.

*Diapia* *pentagona* Targioni-Tozzetti; South Africa, Australia, Italy.

*Diapia* *pgr* Colvée; Spain, Germany.

*Diapia santali* Maskell; New Zealand.

*Diapia squamosa* Newstead and Theobald; Great Britain.

*Epidiaspis* *piricola* Del Guercio; Germany, Italy, France, Russia.

*Parlatoria* *caliathina* Berlee and Leonard; Spain, Victoria, New South Wales.

*Parlatoria pyri* Marlatt; China.

Unarmored—

*Ceroplastes rubens* Maskell; Australia, Hawaii, Japan.

*Lecanium bituberculatum* Targioni-Tozzetti; England, France, Sweden, Italy, Germany.

*Lecanium capreae* Linnaeus; Europe, Nova Scotia.

*Lecanium capyli* Linnaeus; Europe, Algeria.

*Lecanium glandi* Kuwana; Japan.

*Lecanium kuensis* Kuwana; China.

*Lecanium rugosum* Signoret; France, Germany.

*Lecanium tiliae* Linnaeus; Europe.

*Lecanium vihi* Bouché; Europe.

**COLEOPTERA.**

**Buprestidae.**

*Agrius cineraria* Olivier; Europe; introduced into United States; borer.

**Cerambycidae.**

*Cerambyx* *scopoli* Fuessy; Europe; borer.

*Liopus nebulosus* Linnaeus; Europe; borer.
A MANUAL OF DANGEROUS INSECTS.

Curculionidae.
Maptalis cerasi Linnaeus; Europe; bores in branches.
Anthonomus pomorum Linnaeus; Europe; bud weevil. (See Apple.)
Anthonomus pedicularius Linnaeus, A. pyri Boheman, and A. spinatus Redtenbacher; Europe; bud weevils.
Leptops hopei Schonherr; Victoria. (See Apple.)

Scolytidae.
Scolythus pruni Ratzeburg; Europe. (See Plum.)
Taphrogychus bicolor Herbst; Europe; galleries in trees.

Lasiocampidae.
Gasbropacha quercifolia Linnaeus. (See Fruit.)

Geometridae.
Anisopteryx escularia Schiffermiller. (See Forests.)

Cossidae.
Cossus tristis Dru.; Africa. (See Apple.)

Tortricidae.
Capua angustiorana Haworth; Europe, Asia, Africa. (See Apricot.)

Tenthredinidae.
Prionosphorus padii Linnaeus; Europe. (See Plum.)

Trypetidae.
A nastrepha fraterculus Wiedemann. (See Fruit.)
Ceratitis capitata Wiedemann. (See Fruit.)

Itonidae.
※ Contarinia pyrivora Riley; Europe, North America; gall midge.

LEPIDOPTERA.

Lasiocampidae.
Gasbropacha quercifolia Linnaeus. (See Fruit.)

Geometridae.
Anisopteryx escularia Schiffermiller. (See Forests.)

Cossidae.
Cossus tristis Dru.; Africa. (See Apple.)

Tortricidae.
Capua angustiorana Haworth; Europe, Asia, Africa. (See Apricot.)

Tenthredinidae.
Prionosphorus padii Linnaeus; Europe. (See Plum.)

Trypetidae.
A nastrepha fraterculus Wiedemann, attacks Diospyros kaki, the Japanese persimmon. (See Fruit.)
Ceratitis capitata Wiedemann, attacks Diospyros kaki. (See Fruit.)

Hymenoptera.

Coccidae.
Armored—
Aspidiotus (Aonidia) ebeni Leonard; Ceylon.
Unarmored—
Ceroplastes rubens Maskell; Japan; Diospyros kaki.
Coccus bierciatus Green; Ceylon; Diospyros ebenum.
Phenacoccus pergandei Cockerell; Japan; Diospyros kaki.

DIPTERA.

Trypetidae.
A nastrepha fraterculus Wiedemann, attacks Diospyros kaki, the Japanese persimmon. (See Fruit.)
Ceratitis capitata Wiedemann, attacks Diospyros kaki. (See Fruit.)

LEPIDOPTERA.

Cosmopterygidae.
Kakivoria flavofasciata Nagano; Japan; injures fruit.

PINE.

(Pinus spp. Family Pinaceae.)

Evergreen resiniferous trees distributed throughout the northern hemisphere; in the tropical and subtropical regions they are confined to the mountains. They are very valuable timber trees and many of them yield turpentine, tar, pitch from the trunk, and medicinal oils from the leaves and young shoots. Edible seeds are produced by some. For convenience the insect pests are arranged under Conifers.
INSECTS OF PINEAPPLE, PISTACHIO, AND PLANE TREE.

PINEAPPLE.

_(Ananas sativus. Family Bromeliaceae._)

A plant indigenous to America but now cultivated in Hawaii and other parts of the world.

IMPORTANT PINEAPPLE INSECTS.

HEMIPTERA.

Coccidæ.

Armored—
Aspidiotus (Targionia) bromelicx Leonard; England, Seychelles.

Unarmored—
Pseudococcus ananassae Kuwana; Japan.
Pseudococcus brevipes Cockerell; Jamaica, Antigua, Dominica.
Pseudococcus bromelicx Bouche; Hawaii.

LEPIDOPTERA.

Tineidæ.

Erebacis flavistriata Walsingham; Hawaii. (See Sugar cane.)

DIPTERA.

Trypetidæ.

Ceratitis capitata Wiedemann. (See Fruit.)

Dacus xanthodes Broun. (See Fruit.)

COLEOPTERA.

Calandridæ.


PISTACHIO.

_(Pistacia vera, etc. Family Anacardiaceæ._)

A nut-bearing tree of Asia and Europe, cultivated in California.

IMPORTANT PISTACHIO INSECTS.

HEMIPTERA.

Coccidæ.

Armored—
Diaspis gennadii Leonard; Greece, Italy.
Leucacis pistaciæ Lindinger; Cyprus; Pistacia lentiscus.

Unarmored—
Ceroplastes rusc Linnaeus; Pistacia lentiscus, P. terebinthus.

PLANE TREE; BUTTONWOOD; SYCAMORE.

_(Platanus spp. Family Platanaceæ._)

Ornamental deciduous trees of America, Europe, and Asia, valued for their dense shade.

IMPORTANT SYCAMORE INSECTS.

COLEOPTERA.

Anobiidæ.

Xestobium rufivillosum DeGeer; England; bores in wood of old-standing trees.

Scarabæidæ.

Melolontha hippocastani Fabricius and M. melolontha Linneæus, Europe; larve injure roots of seedlings.

Cerambycidæ.

Eucnèthes sarta Solsky; India; bores in trunks of Platanus orientalis.

Ipidæ.

Anisandrus dispar Fabricius; Germany; ambrosia beetle.

LITERATURE.

LINDINGER, L. _Die Schildläuse (Coccidæ),_ 1912.

NÜSSLIN, O. _Leitfaden der Forstinsektenkunde, 2d ed.,_ 1913.

HESS, E. _Der Forstschutz, 1900, vol. 2._

SERRING, E. P. _Indian Forest Insects, Coleoptera, 1914._
PLANTAIN.

PLUM; CHERRY; PRUNE.

*(Prunus spp. Family Rosaceae.)*

Deciduous trees of the northern hemisphere, with showy flowers and delicious fruits, of which many horticultural varieties are cultivated in this country.

A. BETTER KNOWN PLUM INSECTS LIKELY TO BE IMPORTED.

*Eriophyes* spp.

*Species:* *E. phloeocoptes* Nalepa; Europe, North America; *Prunus domestica*, *P. insititia*, *P. spinosa*. *E. similis* Nalepa; Europe; *Prunus armeniaca*, *P. chaenecerasus*, *P. domestica*, *P. insititia*, *P. spinosa*. *E. padi* Nalepa; Europe, North America; *Prunus padus*, *P. domestica*, *P. spinosa.*

*Injury:* Form different kinds of blister galls on plum trees and are quite injurious. These four-legged blister mites are so small that they are easily transported on nursery stock, hence the wide distribution.


Psylla *prunii* Scopoli.

*(The Plum Psylla. Psyllidae; Hemiptera.)*

*Hosts:* Plum, *Prunus spinosa*; *P. insititia*.

*Injury:* Not at present an important pest.

*Description and biology:* Adult, thorax marked with red and brown; abdomen with broad brown bands on sides and back; wings dark brown. Development and generations similar to *P. pyrisuga.* (See Pear.)

*Distribution:* Europe, Siberia.


*Pettophora pedicillata* Kirby.

*(The Cherry Bug. Pentatomidae; Hemiptera.)*

*Hosts:* Cherry; strong-scented flowering shrubs; wild fig.

*Injury:* Probably not at present important.

*Description and biology:* Adult, about 12 mm. long; bright metallic green in color with black spots on dorsum. The greater part of ventral surface, edges of thorax, and two blotches at base of scutellum bright coral red.

*Distribution:* Australia (New South Wales to North Queensland).


*Diphucephala colaspiloides* Gyllenhal.

*(The Cherry Green Beetle. Scarabaeidae; Coleoptera.)*

*Hosts:* Cherry and other fruit trees; shrubs.

*Injury:* Very serious at times. Defoliation by adults.

*Description and biology:* Adult, length 8 mm.; metallic green; smooth; elytra deeply marked with punctured striae. Damage done in this stage. *Larva* feeds on roots of various plants. Not of economic importance. (See plate xxxiii.)

*Distribution:* Southern Australia.

FRENCH, C. Handbook of Destructive Insects of Victoria, 1893, pt. 2, p. 27.
**Rhyynchites coeruleus** De Geer.

*(Twig Cutter. Rhyynchitidae; Coleoptera.)*

*Host:* Apple.

*Injury:* Cuts off apple shoots. Only nursery stock and bush trees attacked.

*Description and biology:* Adult, length 3–4 mm.; deep blue, shiny, clothed with long, upright fuscous pubescence; antennæ, legs, and rostrum black; elytra, with deep punctured striae. Appear in spring and feed on leaves. *Pupate* in soil. *Larva* white, feed about a month, then enter soil. *Eggs* placed singly in soft shoots 2 to 4 inches from tips. Shoots cut off below place of oviposition. (See text fig. 80.)

*Distribution:* Europe.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 117.

**Rhyynchites cupreus** Linnaeus.

*(Plum Borer. Rhyynchitidae; Coleoptera.)*

*Hosts:* Plum, prune, cherry.

*Injury:* Attacks young fruit.

*Description and biology:* Adult, length 3–4 mm., color bronze-copper. Occurs in autumn, hibernates in this stage and reappears in early spring. *Pupates* in ground. *Larva* develops in fruit, causing it to fall. *Eggs* are placed singly in young fruit at base of peduncle. (See text fig. 81.)

*Distribution:* Europe.


**Brachyrhinus laevigatus** Fabricius (Otiorhynchus).

*(Brachyrhinidae; Coleoptera.)*

*Host:* Plum.

*Injury:* To buds and young twigs.

*Description and biology:* Adult, length 6–6.5 mm.; black, shining, without hairs; neck-shield rather flat, disk punctured; wing covers finely furrowed.

*Distribution:* Middle Europe.


**Magdalis armigera** Geoffroy.

*(Plum Stem Piercer. Curculionidae; Coleoptera.)*

*Host:* Plum.

*Injury:* To twigs and foliage.

*Description and biology:* Adult, length 3.5–4.5 mm.; color, dull black; neck shield with thorn-like projections near fore margin, 4-cornered, hardly as wide as long, finely punctate; elytra strigose punctate, space between punctations flat; beak shorter than neck shield. Adult attacks leaves. *Larva* develops in twig. *Pupates* in burrow.

*Distribution:* Europe.

Henschel, G. A. O. Die Schädlichen Forst- und Obstbaum-Insekten, 1895, p. 94.
Curculio cerasorum Herbst (Balaninus).

(Cherry Weevil. Curculionidae; Coleoptera.)

Host: Cherry.

Injury: To fruit.

Description and biology: Adult, length 3-3.5 mm.; color clear brownish red; eyes black; prothorax and ventral surface covered with golden hairlike scales. Larva eats out cherry pit. Pupation takes place in pit.

Distribution: Germany.


Anthonomus rectirostris Linneus.

(Curculionidae; Coleoptera.)

Hosts: Cherry and other fruits.

Injury: Attacks the fruit.

Description and biology: Larva feeds on seeds, preventing fruit from ripening. Eggs are deposited in young fruit.

Distribution: Europe.


Scolytus assimilis Boheman.

(Scolytidae; Coleoptera.)

Host: Plum.


Description: Habits similar to S. rugulosus.

Distribution: Argentina.


Scolytus pruni Ratzeburg.

(Scolytidae; Coleoptera.)

Hosts: Plum, pear, apple.

Injury: Destroys many trees, makes galleries under bark.
Description and biology: Adult, length 4 mm.; head and thorax black, elytra chestnut. Appears in June (France). Pupates in spring. Larval galleries perpendicular to maternal gallery. Eggs deposited in gallery under bark of weakened trees.

Distribution: Europe.


Coleophora anatipennella Hübnerr.
(Cherry Tree Case-Bearer. Elachistidæ; Lepidoptera.)

Hosts: Cherry, apple, sloe.

Injury: Serious attacks at intervals of a few years; feeds on buds and early foliage.

Description and biology: Adult, wing expanse 12 mm.; forewings creamy white with scattered fuscous scales noticeable towards tips, fringe white; hind wings dusky, with long gray fringes. Occurs July to August. Pupa pale brown in color; pupation takes place in its case; period 3 or 4 weeks. Larva, length 12 mm.; reddish brown to orange with dark-brown shiny head. Larval case pistol-shaped, dark brown to black, with white border around mouth. Larvae may be found from August through the winter until June. Eggs are deposited on under side of leaf, hatching in 2 or 3 weeks.

Distribution: Europe.


Argyresthia epippepella Fabricius.
(Hyponomeutidæ; Lepidoptera.)

Hosts: Cherry, plum, hazel.

Injury: Not seriously destructive.

Description and biology: Adult, wing expanse 12 mm.; forewings ochrous brown, inner margin white, interrupted beyond middle by dark-brown spot, which can be traced across the wings as an oblique fascia terminating in the costa. Larva feeds on shoots, leaf, and blossom buds.

Distribution: Europe.


Argyresthia nitidella Fabricius.
(Cherry Fruit Moth. Hyponomeutidæ; Lepidoptera.)

Hosts: Cherry, hawthorn.

Injury: Seldom serious. Attack fruit just after it has set.

Description and biology: Adult, wing expanse 11 mm.; forewings light brown, with white or cream colored inner margins; in middle there is a fascia of deeper brown color which terminates in tip of wings. Occurs in May (Stainton). Cocoon dense and white; pupal period about 15 days. Larva light green; head, first thoracic segment and legs brown. Eggs placed on shoots near flower bud. Overwinters in egg stage. (See text fig. 82.)

Distribution: England.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 192.
Xylena ornithopus Rott.

Host: Plum.
Injury: Defoliation.

Description and biology: Adult, forewing 15-17 mm. long; grayish white mixed with weak brownish. Occurs August and September (Germany). Pupates in July in earth. Larva 33 mm. long; blue-green in color, marked with white spots; three white dorsal lines; head whitish green. Overwinters as egg.

Distribution: Europe.


Xylena soca Rott.

Hosts: Plum, elm, linden.
Injury: Defoliation.

Description and biology: Adult, forewing 17-20 mm. long; brown with a mixture of gray or rose color. Occurs August and September (Germany). Pupates in earth. Larva length 33 mm.; color apple-green; marked with white spots and a broad white dorsal stripe; head shining green. Overwinters as egg.

Distribution: Europe.


Laspeyresia funebrana Treitschke.

Host: Plum Maggot. Tortricidae; Lepidoptera.

Injury: Attacks fruit; damage not easy to detect. "Caterpillar plentiful in plum pies." (Stainton.)

Description and biology: Adult, wing expanse about 12 mm.; forewings purplish gray, clouded with smoky gray; at anal angle is an indistinct, ocellated patch, edged with pale gray and inclosing four black dots. Pupates in whitish cocoon under rough bark or debris in spring. Pupa amber color. Larva, length 15 mm., chestnut red in color, with sides yellowish or entirely deep red. Eggs, placed at base of fruit stalk, hatching in 10 days. (See text fig. 83.)

Distribution: Europe, Asia Minor.


Laspeyresia woeberiana Schlffermiller.

Host: Prunus sp. and other fruits.
Injury: Injury to bark.

Description and biology: Adult, wing expanse 16 mm., forewing dark brown, with rusty-yellow and lead-gray oblique lines; five white notches on fore margin, and a twisted lead line from the notches to the eye spot; speculum on a rusty-yellow ground, marked with black. Two broods, first May and June; second August and September (Germany). Pupa chestnut brown, pupates in larval gallery. Larva length 9 mm.; dirty green, red-headed, sparsely hairy. Feeds in galleries in bark; betrayed by masses of frass hanging out of air holes. Eggs placed in crevices in bark.

Distribution: Europe.

A Destructive Cherry Insect.
The cherry green beetle (*Diphucephala colaspisoides*): Adult, larva and injury. (French.)
The Cherry Borer.

The cherry borer (*Cryptophaga unipuncta*): Moth, larva, pupa, and injury. (French.)
A Poplar Borer.

Poplar borer (Eolesthes sarta): Fig. 1.—Eggs. Fig. 2.—Empty egg. Figs. 3, 4, 5.—Larval stages. Figs. 6, 7.—Pupa. Fig. 8.—Male. Fig. 9.—Females. (Stebbing.)
POTATO WEEVIL. RHIGOPSIDIUS TUCUMANUS HELLER. (PIERCE.)
Cryptophaga unipunctata Donovan.
(The Cherry Borer. Xyloryctidae; Lepidoptera.)

Hosts: Cherry, peach, honeysuckle.


Description and biology: Adult, wing expanse 37 mm.; a white satiny moth; front of head, antennae, and a dot on forewings, black. Larva, length, 50 mm.; pinkish white, hairy; covers entrance to burrow with silken web in which collects the sawdust-like excrement. (See plate xxxiv.)

Distribution: Australia.

FRENCH, C. Handbook of Destructive Insects of Victoria, 1891, pt. 1, p. 113.

Oiethreutes pruniana Hübner.
(Plum Bud-moth. Tortricidae; Lepidoptera.)

Host: Prunus sp.

Injury: To buds and shoots.

Description and biology: Adult, forewing 7-8 mm.; from middle of fore margin to inner angle, bluish black, mixed with brownish black; border third golden white clouded with brownish gray; apical point deep black; palpi grayish black; occurs June and July (Germany). Pupates in grass, or between leaves sewed together, during latter part of May. Larva, length 20 mm.; greenish yellow, head white, divided thoracic shield and anal lobes shining black; feeds in shoots and developing leaves drawn together; occurs in spring until middle of May. Eggs placed singly on buds. Overwinters in egg stage.

Distribution: Europe.

MONTILLOT, L. Les Insectes Nuisibles, 1891, p. 176.

Hoplocampa fulvicornis Panzer.
(Plum Fruit Sawfly. Tenthredinidae; Hymenoptera.)

Host: Plum.

Injury: Frequently causes considerable damage. Attacks fruit and eats out interior. Causes fruit to fall.

Description and biology: Adult, wing expanse less than 8 mm.; color black, with yellow, yellowish-red or reddish-brown legs. Pupates in soil in brownish cocoon. Larva, length 12 mm.; creamy-white, sometimes slightly pinkish; head brown; caudal end somewhat attenuated and slightly curved. Eggs minute, greenish white and transparent; placed in unopened blossom; hatch in a few days. (See text, fig. 84.)

Distribution: England, Europe.

THEOBALD, F. V. Insect Pests of Fruit, 1909, p. 376.

Prophorus padi Linnæus.
(Plum Leaf Sawfly. Tenthredinidae; Hymenoptera.)

Hosts: Plum, pear, hawthorn, bramble, mountain ash, birch.

Injury: Important. Defoliation.

Description and biology: Adult, female, color mainly black; thorax shiny, covered with grayish brown and two dull white spots; abdomen with scattered, pale, very fine hairs; legs white, except middle of femora, apex of tibia and posterior tarsus,
which are black. Two broods, frequently three. First brood occurs in May, second about middle of June. (England.) Active during warmest part of day. Pupa pale gray. Pupates in ground; period 9 to 12 days. Larva, green or grayish green, with almost white sides; head usually pale dull orange brown. Larval stage of first brood lasts 3 weeks; second brood overwinters in soil. Eggs are placed on under surface of leaves. Incubation requires 8 days. (See text fig. 85.)

*Distribution*: England, Europe.


---

**HEMIPTERA.**

*Coccidae.*

**Armored—**

*Aspidiotus (Diaspidiotus) patavinus* Berlese; Italy; *Prunus cerasus.*

*Diapsis pentagona* Targioni-Tozzetti; Italy, Japan, Cape Colony; *Prunus cerasus, P. pseudocerasus, P. armeniaca, P. laurocerasus.*

**Unarmored—**

*Kuwania parva* Maskell; Japan; *Prunus cerasus.*

*Lecanium cerasi* Goethe; Germany, England; *Prunus cerasus.*

*Lecanium cerasorum* Cockerell; Japan; *Prunus cerasus.*

*Lecanium corvii* Linneus; Europe; *Prunus cerasus, P. armeniaca, P. avium, P. domestica, P. insititia, P. laurocerasus, P. padus, P. spinosa.*

---

Fig. 84.—The plum fruit sawfly (*Hoplocampa fulvicornis*): Adult, larva, and injury. (Ent. Tidsk.)

**B. OTHER IMPORTANT PLUM AND CHERRY INSECTS.**
INSECTS OF PLUM AND CHERRY.

Coccidae—Continued.

Unarmored—Continued.

*Lecanium ruposum* Signoret; France, Germany; *Prunus cerasus*.

*Lecanium prunastri* Fonscolombe; plum, peach (see pl. iv, fig. 3).

*Pulvinaria betulae* Linnaeus; Denmark, England, Switzerland; *Prunus cerasus*, *P. armeniaca*, *P. domestica*.

**Lygaeidae.**

*Nyssus sinuata* Bargroth; Australia; plum and cherry. (See Fruit.)

**Coleoptera.**

**Bostrychidae.**

*Bostrychus ocellatus* Fabricius; Africa, West Indies. (See Citrus.)

**Buprestidae.**

*Cypselis tentacronia* Linnaeus; Europe; bores in *Prunus spinosa*.

**Cerambycidae.**

*Saperda scalaris* Linnaeus; Europe; borer in cherry trees.

*Liopus nebulosus* Linnaeus; Europe; borer in cherry trees.

*Uracanthus acutus* Blackburn; Europe. (See Peach.)

**Curculionidae.**

*Leptophloeus Schonherr; Victoria. (See Apple.)

*Magdalia carbonaria* Linnaeus; Europe; plum. (See Birch.)

*Magdalia cerasi* Linnaeus, and *M. pruni* Linnaeus; Europe; bore under bark of cherry and plum.

*Curculio herbsti* Gemminger (*Balaninus*); Europe; breeds in fruit of cherry and plum.

*Curculio rubidus* Gyllenhal (*Balaninus*); Europe; breeds in fruit of plum.

*Anthonomus druparum* Linnaeus; Europe; breeds in buds of plum and cherry.

**Scolytidae.**

*Scolytus mali* Bechst; Europe; bores in trunk and branches of plum.

**Lepidoptera.**

**Noctuidae.**

*Diloba ceruleocephala* Linnaeus; Europe; plum, cherry. (See Apple.)

**Xylophagidae.**

*Cryptophaga unipunctata* Donovan; Australia; bores in cherry trees.

**Tortricidae.**

*Lospagyria prunivora* Ragonot; Europe; breeds in fruit.

*Olethreutes variegana* Hübnner, Europe; feeds on buds and shoots.

**Geometridae.**

*Hibernia rupestris* Hübnner; Europe. (See Fruit.)

*Anisopteryx xantharria* Schiffermiller; Europe. (See Forests.)

*Biston hirtarius* C. ; Europe; defoliator.

*Cheimatobia boreata* Hübnner, and *C. brunata* Linnaeus; Europe; defoliators.

**Lasiocampidae.**

*Gastropacha quercifolia* Linnaeus; Europe. (See Fruit.)

**Lymantridae.**

*Teia anartoides* Walker; Australia; cherry. (See Fruit.)
Hyponomeutidae.
*Hyponomeuta matinellus* Zeller and *H. padellus* Linnaeus; Europe; introduced in United States; cherry. (See Apple.)
*Argyresthia congener* Zeller; Europe, British Columbia, Japan; attacks fruit of cherry and plum. (See Apple.)

HYMENOPTERA.

Tenthredinidae.
*Pamphilius flaviventris* Retz.; Europe. (See Pear.)

DIPTERA.

Trypetidæ.
*Ceratitis capitata* Wiedemann, attacks fruit of *Prunus cerasus*. (See Fruit.)
*Anastrepha fraterculus* Wiedemann, attacks Japanese plum. (See Fruit.)
*Anastrepha ludens* Loew.; Mexico. (See Fruit.)

POMEGRANATE.

*(Punica granatum.* Family *Lythraceae.*

A fruit-bearing tree of Asia, extensively cultivated throughout the world. Propagated by cuttings and seed.

IMPORTANT POMEGRANATE INSECTS.

LEPIDOPTERA.

Lycaenidae.
*Virachola insocrates* Fabricius; India; bores in fruit. (See Fruit.)
*Virachola litia* Klug, the pomegranate butterfly; Egypt; larva attacks fruit (Gough, L. H.: The Agric. Journ. Egypt, vol. 3, 1914, p. 105, pl. 8, figs. 5-7.)

Pyralidae.
*Cryptoblabes gnidiella* Miller; Egypt; breeds in fruit (Gough, l. c., p. 104).

POPLAR; ASPEN; COTTONWOOD.

*(Populus spp.* Family *Salicaceae.*

Soft-wooded trees of the Northern Hemisphere, often used in landscape gardening.

A. BETTER KNOWN POPLAR INSECTS LIKELY TO BE IMPORTED.

*Saperda* spp.

(Poplar Borers. Cerambycidae; Coleoptera.)

*Species:* *S. carcerarius* Linnaeus, poplar borer; Europe; poplar, willow, aspen. *S. populnea* Linnaeus, aspen borer; Europe, Siberia, United States Pacific coast; aspen, poplar, willow. *S. scalaris* Linnaeus; Europe; aspen, walnut, cherry, apple, beech.

*Injury:* The first two are very injurious species.

*Biologia:* The egg is laid in the bark and the larva first bores in the bark but later goes into the wood. It pupates in the larval tunnel.


*Trochilium* spp.

(Hornet Moths. Sesiidae; Lepidoptera.)

*Species:* *T. apiformis* Clerck; Europe; poplar (*Populus nigra, P. canadensis*); aspen (*Populus tremula L.*); ash. *T. annatiaeformae*; India; *Populus euphratica*.

*Injury:* Bore in wood.


Stebbing, E. P. Manual Forest Zoology India, 1908, pp. 124, 125, fig. 255.
B. OTHER IMPORTANT POPLAR INSECTS.

HEMIPTERA.

Aphididae.
Pempheris bursarius Linnaeus; Europe; foliage.

Pempheris immunda and P. napei; India; attacks the twigs of Populus euphratica and P. tremula.
Pempheris flagellina Fonsc. (marisupialis Koch); Europe; forms pocket-shaped galls on the midrib of leaves of poplar.
Pempheris vesicalis Koch; Europe; foliage of Populus alba.

Asiphum tremulae De Geer; Europe; attacks young shoots, leaves and petioles of aspen (Populus tremula).

Cocidae.
Armored—

Chionaspis saltici Linnaeus; Europe; Populus balsamifera, P. monilifera, P. nigra, P. tremula.

Cryptochromphasia africana Newstead; Egypt.

Unarmored—

Ceroplastes rusticus Linnaeus; Italy.

Pulicaria betulez Linnaeus; Europe; Populus alba, P. nigra, P. tremula.

Lecanium corylit Linnaeus; Europe; Populus tremula, P. virginiana.

Lecanium douglasii Douglas; Europe; Populus alba, P. tremula.

COLEOPTERA.

Anobiidae.

Ptilinus fuscus Geoffroy; Europe; bores in dead wood of standing living trees.

Buprestididae.

*Agrius viridus Linnaeus (see Oak) and A. sexguttatus Brahm.; Europe, bores in bark and branches of poplars and aspens.

Capnodis millaria Klug; India; bores in Populus euphratica.

Paeleonota variolosa Paykull; Europe; bores in bark of poplar and aspen.

Melanophila pici Tallas; South Europe, Algeria; bores in wood of young poplars.

Scarabaeidae.

Ammophilus solstitialis Linnaeus; Europe; larvae attack roots of small plants.

Melolontha hippocastani Fabricius and M. melolontha Linnaeus; Europe; larvae attack roots of seedlings.

Cerambycidae.

Eolestes casta Soisky; India; bores in Populus alba and P. euphratica. (See pl. XXXV.)

Lamina tector Linnaeus; Europe; bores in bark and larger cuttings of poplar and aspen.

Saperda carceraria Linnaeus, S. scalaris Linnaeus and S. populnea, Linnaeus; Europe; bores in branches and trunk. The latter occurs on our Pacific Coast. (See text fig. 86.)

XYLOLACRUM RUSTICUM Linnaeus; Russia; bores in bark and sapwood.

Purpuriscenus vachani Linnaeus; Baluchistan; bores in Populus ciliata.

Chrysomelidae.

*Phyllocoeca vitellina Linnaeus; Europe; America; leaf beetle. (See Willow.)

Crepidofera aurata Marsham; Europe; leaf beetle on Populus laurifolia and P. alba. (See Willow.)

Cucuilionidae.

Orchestes salticus Linnaeus; Europe; mines the leaves.

Orchestes populic Fabrictius; Europe; mines the leaves of Populus nigra and P. dilatata.

*Cryptochromphasia tepathi Linnaeus; Europe, Eastern United States; breeds in the stems and twigs.

Ipsida.

Xyleborus cypripedium Ratzburg; Germany; ambrosia beetle of poplar and aspen.

LEPIDOPTERA.

Cossidae.

Cosus cosus Linnaeus, goat moth; Europe; bores in wood. (See Willow.)

*Zeuzera pyrina Linnaeus; Europe; bores in wood. (See Horse-chestnut.)

Geometridae.

Hibernia aurantiaria Esp., H. defoliaria Linnaeus and H. marginaria Borkh.; Europe; defoliators.

Lasiocampidae.

Eriqaster lanceolata Linnaeus, and Malacosoma neustria Linnaeus; Europe; defoliators.

Lymantridae.

*Euproctis chrysorrhoea Linnaeus, *Lymantria monacha Linnaeus, *Porthetria dispar Linnaeus Porthetria similis Fuesty, Stilpnotia salicea Linnaeus; Europe; defoliators. (See Forest defoliators.)

Sesiidae.

Sciopteron tabaniformis Rott.; Europe; bores in base of trunk.
Cimbicidae.  
*Cimbex variabilis* Klug, sawfly; Europe; attacks leaves, and adults girdle twigs.  
*Pseudoclarvellaria amerinae* Linnaeus, a sawfly; Europe; attacks foliage.

Tenthredinidae.  
*Nematus (Crassus) septentrionalis* Linnaeus and *Trichiocampus viminalis* Fallen; Europe; sawflies.

---

**Fig. 86.**—Poplar borer (*Saperda populnea*): Branch of aspen with galls containing larva, pupa, and adult. (Barbey.)

**DIPTERA.**

Itonillidae (Cecidomyiidae).  
*Rhabdophaga saliciperda* Dufour; Europe; attacks *Populus alba*. (See Willow.)
INSECTS OF POPULAR AND POTATO.

LITERATURE.

Nüsslin, O. Leitfaden der Forstsystemenwissenschaft, 2d ed., 1913.
Hess, R. Der Forstschutz, 1888, 1900.
Bargagli, L. Rassegna Biologica Rincoforo Europei, 1883-1887.
Lindinger, L. Die Schildläuse (Coccidea), 1912.

POTATO.

(Solanum tuberosum Linnaeus. Family Solanaceae.)

Although we grow many potatoes in the United States there has been a very large importation trade with other countries. Owing to the danger of introducing certain diseases especially, the Federal Horticultural Board has placed restrictions on the importation of potatoes. There are a number of important insect pests which need to be guarded against almost as closely as the diseases.

A. BETTER KNOWN POTATO INSECTS LIKELY TO BE IMPORTED.

* Rhizoglyphus (Coepophagus) echinopus F. and R.

(Potato Root Mite. Tyroglyphidae; Acarina.)

Hosts: Potato, parsnip, tulips, lilies, orchids, and many weeds.
Injury: Very destructive to roots and tubers.
Description and biology: A very tiny mite which breeds in roots and is quite destructive. It may readily be transported with root crops.
Distribution: France, Italy, Portugal, Palestine, Chile, Australia, California.

Epilachna spp.

(Potato Ladybird Beetles. Coccinellidae; Coleoptera.)

Species: E. 28-maculata Motschulsky; China; potatoes, Solanum spp. E. 28-punctata Fabricius; Asia, Singapore, Australia; Solanaceae, Cucurbitaceae. E. dodecastigma Mulsant; Asia, Malaysia. Australia; Solanaceae Cucurbitaceae. E. territa Mulsant; Java; Spanish peppers, Solanaceae. E. pusillanina Mulsant; Java, Solanaceae. E. phyto Mulsant; Java; Solanaceae. E. guttato-pustulata Fabricius; Australia; potato.
Injury: Attack foliage in larval and adult stage.

Rhiogopsidius tucumanus Heller.

(Argentine Potato Weevil; Psaliduridae [Byrsopidae]; Coleoptera.)

Host: Potato.
Injury: Bores in potato, making it unfit for use. Has been received alive in the United States from South American potatoes.
Description and biology: Adult weevil, light brown or grayish, with roughened elytra and short broad beak which rests in a deep groove in front of the anterior legs. Length 9 mm. Pupa white with rudiments of all appendages folded on the underside. Found in the potato. Larva white legless with chitinized brownish yellow head. Bores in the tubers. (See plate xxxvi.)
Distribution: Argentina, Peru, Bolivia, Chile.
Premnotrypes solani Pierce.

(Peruvian Potato Weevil. Brachyrhinidae [Otiorhynchidae]; Coleoptera.)

Host: Potato.
Injury: Bores in the tubers. Has been received alive in the United States in potatoes from Peru.

Description and biology: Adult weevil bronzy brown somewhat tuberculate with the thorax narrower than the elytra; beak moderately long. Length 7 mm. Pupa white with rudiments of all appendages folded on the underside. Found in the potato. Larva white, legless, with chitinized brownish yellow head. Bores in the tubers. (See plate xxxvii, figs. 1, 2.)

Distribution: Peru.

Pierce, W. Dwight. Journ. Agr. Research, vol. 1, No. 4, pp. 346, 349, text figs. 1, 2; pl. 41, figs. 1, 2.

Trypopremnon latithorax Pierce.

Host: Potato.
Injury: Bores in the tubers. Has been received alive in the United States in potatoes from Peru.

Description and biology: Adult weevil brown, tuberculate, with a very broad prothorax, scrobes abruptly terminated behind, mandibles with a tooth beneath. Length 6 mm. Pupa white with rudiments of all appendages folded on the underside. Found in the potato. Larva white, legless, with chitinized brownish yellow head. Bores in the tubers. (See plate xxxvii, fig. 3.)

Distribution: Peru.

Pierce, W. Dwight. Journ. Agr. Research, vol. 1, No. 4, pp. 349-350, text fig. 3; pl. 41, fig. 3.

Hypera (Phytomonus) spp.

(Potato Leaf Weevils. Curculionidae; Coleoptera.)

Species: H. variabilis Herbst; breeds on the leaves of potato, clover, etc., and attacks bean, cabbage, service berries, Plantago lanceolata, Atriplex patula. H. crinita Boheman; Algeria and Tunis; breeds on potato.

Injury: These are potentially important pests. Judging from the ease with which the clover pests of this genus have been imported it is important to guard against these weevils.

Description and biology: Similar in form to the well-known clover-leaf weevil, Hypera punctata. The larve feed externally on the leaves and pupate in silken cocoons.

B. OTHER IMPORTANT POTATO INSECTS.

HEMIPTERA.

Miridae (Capsidae).

Phytocoris pabulinus Linnaeus; Europe; sucks juices of stems.

Jassidæ.

Eupteryx solani Curtis; Europe; injures leaf.

COLEOPTERA.

Bathyscia wollastonii Janson, the pigmy potato beetle; Europe, often a serious pest.

Elateridae.

Agriotes lineatus Linnaeus. (See Tobacco.)

Lacon mursinus Linnaeus; Europe; wireworm.

Meloidæ.

Zonabris floralis Pallais, Z. 14-punctata Pallais, Epicauta rufidorsum Goeze and E. sibirica Pallais, blister beetles; Europe; very destructive.
INSECTS OF POTATO AND PRICKLY PEAR.

**Curculionidae.**
*Hypera variabilis* Herbst; Europe. (See Clover.)
*Desiantha nociva* Lea; Australia; larvæ and adults destroy young plants. (See Tomato.)

**LEPIDOPTERA.**

*Euchelia jacobae*, the cinnabar moth; Europe, injurious.

**Sphingidae.**
*Acherontia atropos* Linnaeus; death’s head moth; Europe; larvæ feed on potato. (See text figs. 87, 88.)

**Hepialidae.**
*Hepialus lupulinus* Linnaeus; Europe; breeds at roots.
*Hepialus humuli* Linnaeus; Europe. (See Hops.)

---

**Fig. 87.—Death’s-head hawk-moth (*Acherontia atropos*): Adult somewhat reduced. (Kirby.)**

---

**Noctuidæ.**
*Hydrcopic micacea* Esp.; the rosy rustic; Europe, Canada; potato-stalk borer.
*Gortyna ochracea* Hübner; Europe; stalk borer.
*Gortyna flavago* Newman; Europe; stalk borer.
*Persectania evengi*; Australia; climbing cutworm.
*Agrotis spina*, Bugong moth; Australia; cutworm.
*Euxoa radians*, Australia; cutworm.
*Euplexis nigerima*, Australia; cutworm.

**Pyralidae.**
*Lineodes ochracea*.
*Pachyzaena phaenoptera*, Bermuda.

**DIPTERA.**

**Sapromyzidae.**
*Lonchza splendida* Loew, New Zealand, Australia, Oceanica. (See Tomato.)

**PRICKLY PEAR; TUNA; BARBARY FIG.**

(*Opuntia* spp. Family Cactaceæ.)

The common broad-leaied cacti or prickly pears often yields edible fruit.
**IMPORANT PRICKLY-PEAR INSECT.**

**DIPTERA.**

Ceratitis capitata Wiedemann; attacks Opuntia tuna, and O. vulgaris. (See Fruit.)

**PURSLANE.**

(*Portulaca oleracea.* Family Portulacaceae.)

**LEPIDOPTERA.**

Low, fleshy, perennial or annual herbs mostly American. The purslane is cultivated for its edible foliage. Other species are cultivated for their flowers.

**IMPORTANT PURSLANE INSECT.**

**LEPIDOPTERA.**

Hellula undalis Fabricius; Europe, Australia, parts of United States. (See Cabbage.)

**QUINCE.**

(*Cydonia oblonga,* etc. Family Rosaceae.)

Ornamental shrubs and trees from Asia now widely cultivated. *C. oblonga,* the quince, yields a fruit used in preserves. *C. japonica* is much prized as an ornamental shrub.

**IMPORTANT QUINCE INSECTS.**

**HEMIPTERA.**

Lecanium rugosum Signoret; Europe.

*Lecanium persicæ* Fabricius; Europe, Australia, California.

*Lecanium coryli* Linnaeus; Europe.

Aspidiotus (Diaspidiotus) africanus Marlatt; South Africa.
INSECTS OF QUINCE, RADISH, AND RAPE.

COLEOPTERA.

Curculionidae.

_Curculionis barbicornis_ Latreille; Europe. (See Apple.)

_Curculionis pruni_ Linnaeus; Europe; bores under bark.

LEPIDOPTERA.

Cossidae.

_Cossus tristis_ Dru.; Africa. (See Apple.)

DIPTERA.

Trypetidae.

_Ceratitis capitata_ Wiedmann. (See Fruit.)

_Bactrocera tryoni_ Froggatt; Orient. (See Fruit.)

RADISH.

(Raphanus spp. Family Cruciferae.)

Cultivated root crops native of Europe and Asia. Grown from seed. (See Crucifers.)

A. A RADISH INSECT LIKELY TO BE IMPORTED.

*Anthomyia radicum* Meigen.

(Radish Fly. Anthomyidse; Diptera.)

Hosts: _Raphanus_ spp. (including radish), _Brassica_ spp. (cabbage, etc.).

Injury: Breeds in the roots.

Description and biology: Male fly blackish, female ash gray; scutellum blackish with three black streaks; abdomen light gray, with black medium streak; undersides and face white in male, front triangle and all appendages black; wings clear; length 4.5-5.5 mm. Maggot whitish, 6 mm. long. Pupates in soil.

Distribution: Europe, and has been introduced into North America.


B. OTHER IMPORTANT RADISH INSECTS.

COLEOPTERA.

Curculionidae.

_Ceutorhynchus assimilis_ Paykull, Europe; breeds in seed pod.

_Ceutorhynchus raphini_ Fabricius; Europe; breeds in stem.

_Ceutorhynchus robertii_ Gyllenhal; Europe; breeds in crown gall on _Raphanus_ raphanistrum.

LEPIDOPTERA.

Pyralidae.

_Evergestis extimalis_ Sc. (See Rape.)

RAPE.

(Brassica napus Linnaeus. Family Cruciferae.)

An important forage and cover crop; also valuable for the oil compressed from the seed.

A. BETTER KNOWN RAPE INSECTS LIKELY TO BE IMPORTED.

_Phyllostreta vittula_ Redtenbacher.

(Rape and Grain Beetle. Chrysomelidse; Coleoptera.)

Hosts and injury: Mines leaves of _Setaria_; adults feed on beets and rape (Hungary); larva in base of stems of barley, rye, and wheat, causing much damage (Scandinavia; Russia).

Description: Beetle striped with yellow.

Psyllodes chrysocephala Linnaeus; Psyllodes napi Fabricius.

(Rape Flea Beetles. Chrysomelidae; Coleoptera.)

Hosts: Crucifers, rape, cabbage, etc.
Injury: Adults feed on foliage, flowers, and fruit.
Biology: Eggs are laid in the leaf axils. Larvae bore into stem and roots. Breed continuously through season.
Distribution: Europe.

Evergestis extinalis Sc.

(Rape Seed Worm. Pyralidae; Lepidoptera.)

Hosts: Rape, radish, cabbage.
Injury: Feeds on the seed, spinning a web among the fruiting heads.
Description and biology: Moth, wing expanse 26 mm., forewings light yellow ochraceous, with two rusty-brown transverse lines, violet-gray fringe. Larva yellowish green, with lateral gray stripe and four dorsal rows of dark-brown spots; head and thoracic shield black; 18 mm.

B. OTHER IMPORTANT RAPE INSECTS.

COLEOPTERA.

Nitidulidae.
Meligethes xeneus Fabricius; Europe; larvae feed on young shoots.
Curculionidae.
Ceutorhynchus assimilis Paykull; Europe; breeds in fruit.
*Ceutorhynchus quadridens Panzer; Europe; Long Island, N. Y.; breeds in roots.
Ceutorhynchus sulciicollis; Europe; forms galls on roots. (See text fig. 89.)

LEPIDOPTERA.

Hepialidae.
Hepialus humuli Linnaeus; Europe. (See Hops.)

DIPTERA.

Hionididae.
Dasineura brassicae Winner; Europe; attacks fruit. (See Cabbage.)

RASPBERRY.

RATTAN.

(Calamus spp. Family Palmaceae.)

Palms of tropical Asia, some of which are used to furnish rattan canes. They make excellent conservatory plants.

IMPORTANT RATTAN INSECTS.

COLEOPTERA.

Lyctidae.
Lyctus brunneus Stephens; Europe, Australia; bores in furniture and sapwood on unseasoned timber.

LITERATURE.

INSECTS OF RHUBARB AND RICE.

RHUBARB.

(Rheum rhaponticum, etc. Family Polygonaceae.)

Robust perennial herbs originating in Asia and Russia. The rhubarb plant has been developed into several garden varieties. Propagated by root division or from seed.

IMPORTANT RHUBARB INSECTS.

COLEOPTERA.

Chrysomelidae.

Chrysomela concinna Marsh; flea-beetle; Europe. Phyllotreta nemorum Linnaeus; Europe. (See Crucifers.)

Curculionidae.

Hypera rumicis Linnaeus; Europe; breeds on leaves.

RICE.

(Oryza sativa Linnaeus. Gramineae.)

Rice is still an important product for importation in spite of the steadily increasing production in our own country. The principal sources of importation are Japan, China, India, Mexico, and Honduras. The danger of importing rice insects is two-fold, through the grain itself, husked or unhusked, and its original containers, and through rice stalks used in packing fragile articles of commerce. The similarity of rice and grain insects lends importance to any rice pest introduced into the United States.

A. RICE INSECTS LIKELY TO BE IMPORTED.

Schoenobius bipunctifer Walker.

(Rice Stem Borer. Lepidoptera.)

Host: Rice.

Injury: Bores in stalks, causing infertility.

Description and biology: Adult moth, straw-yellow color, the forewings having one black dot on each. Body about one-half inch in length, wing expanse about 1 inch. Pupa in silken case in straw. Larva bores in the stalk and remains in the stubble from November to June. Eggs laid in clusters on the leaves, covered with hairs; hatch in a week.

Distribution: India.


Chilo auricillia Dudgeon.

(Rice Stem Borer. Pyralidae; Lepidoptera.)

Host: Rice, sorghum, corn, sugar cane, Pennisetum.

Injury: Bores in stems of grasses.

Description and biology: Adult moth with metallic spots on fore wings. Larva whitish with black head, thoracic shield and setigerous spots, and with purplish brown stripes.

Distribution: India.


B. OTHER IMPORTANT RICE INSECTS.

The rice plant has many pests which attack the leaves, stalks, and roots, but which are not very likely to be imported. It is, however, of importance to briefly mention these in view of unforeseen possibilities of importation.
ORTHOPTERA.

Acridiidae and Locustidae.
Hieroglyphus banian Fabricius; India. (See Pl. XXXVIII.)
Xiphidium variipenne; Hawaii.
Oxya velox Fabricius; Hawaii, Formosa.
Oxya intricata Stål, and Raccila okinavensis Matsumura; Formosa and Orient.

Gryllotalpidae.
Gryllotalpa africana Beauvial; Hawaii, Africa, Formosa, Asia, Australasia, New Zealand.

HEMIPTERA.

Jassidae, Cercopidae and Fulgoridae.
Deltocephalus dorsalis Motschulsky; Formosa.
Tettigoniella spectra Distant; India. (See text fig. 90.)
Zygma subrufa Motschulsky and Pyxus costalis Walker; Formosa.
Dictyophora sinica Walker, Diostrombus politus Uhler, Nisia atrovenosa Lethierry, Delphax furcifera Horvath, Zygma maculifrons Motschulsky, Cicadula fascifrons Stål, C. o-notata Fallen, Nephotettix apicalis Motschulsky, and Tetigonia virgin Linnaeus; Formosa and Orient.

Capsidae.
Lygus oryzse Matsumura; Formosa, Orient.

Coreidae.
Leptocoris varicornis Fabricius; Japan, China, India, Philippines, Ceylon. (See text fig. 91.)

Pentatomidae.
Aenaria lewisi; Japan.
Plantia affinis Dallas; New South Wales.

COLEOPTERA.

Cucujidae.
Lxmotmctus rhizophagoides Walker; Ceylon, Germany; injures dry rice and grain.

Searabreidae.
Anomala citis Fabricius; India; root borer.
Phyllognathus dionysius Fabricius; India; root destroyer. (See Pl. XXXIX.)

Chrysomelidae.
Hispa senescens Baly; Assam, Burma, Bengal, Malabar. (See text fig. 92.)
Hispa callicantha; Japan.
Chrysomelidae—Continued.

Chalcocnema basalts Baly; India; flea-beetle. (See text fig. 93.)
Lema flavipes Suffrian; Japan.

Curculionidae.

Echinocnemis squameus Billberg; Formosa; root weevil.
Hypomeces unicolor Fabricius; Java.

LEPIDOPTERA.

Pyralidae.

Chilo simplex Butler; India, Formosa. (See Sugar cane.)
Nymphula depuncalis Guêné; rice case bearer; India, Burma, Ceylon, Java, Australia; feeds on leaves. (See pl. XL.)
Nymphula fluctuosa Zeller; India.
Melissoblattes gularis Zeller; Japanese grain moth; Japan, England; larvae injure stored rice.

Noctulidae.

Prodenia litura Fabricius; India, Egypt; the cotton worm.
Spodoptera mauritia Boisduval; Africa, Asia, Australia; army worm.
Nonagria inferens Walker; Formosa, Orient.

Hesperidæ.

Parnara mathias Fabricius; India; the rice skipper. (See pl. XLI.)

Galleriidæ.

Paraletes modesta Butler; Japan, Hawaii; larvae injure stored rice.

Fig. 93.—Rice flea-beetle (Chalcocnema basalts): a, Adult, b, head, enlarged; c, hind leg, enlarged. (Maxwell-Lefroy.)

ROSE.

(Rosa spp. Family Rosaceæ.)

Ornamental deciduous shrubs bearing beautiful flowers, much imported in nursery stock.

A. AN IMPORTANT ROSE INSECT LIKELY TO BE IMPORTED.

Adoretus umbrosus Fabricius and its var. tenuimaculatus Waterhouse.

(The Japanese Rose Beetle. Scarabæidæ; Coleoptera.)

Hosts: Rose trees, citrus, grape, cotton, sugarcane.

Injury: Injurious to citrus, rose, grape, etc., in Hawaii, Rose trees in Fiji, and sugar cane in Java, devouring the foliage. The larvae feed at the roots. May be introduced in the soil.

Biology: The adult is nocturnal in habit, hiding beneath the soil in the day and emerging in swarms at night. Larval stage, 17 days, pupal stage about 10 days, and egg stage from 6 to 8 days.

Distribution: Hawaii, Fiji, Japan, Java.


B. OTHER IMPORTANT ROSE INSECTS.

HEMIPTERA.

Unarmored—

Lecanium pulchrum Marchal; Germany, Rosa arvensis.
Lecanium perornatum Cockerell and Parr.; Austria; Rosa canina.
A MANUAL OF DANGEROUS INSECTS.

Coccidæ—Continued.

Unarmored—Continued.

Icerya montserratensis Riley and Howard; Trinidad, Jamaica, Panama, Colombia, Nicaragua, Porto Rico.
Icerya stygellarum Westwood; China, Mauritius, Natal, England.
Leaniodiaspis sardoa Targioni; Algeria.
Rhizocus falcifer Künkell; Algeria, Sicily.
Armored—

*Leucaspis japonica Cockerell; Rosa laevigata. Has been introduced and is established in the United States.

Aspidiothus (Pseudacoccus) articulatus Morgan; Peru.
Aspidiothus (Chrysomphalus) dictyospermi pinnulifera Maskell; Sicily, Italy, etc.
Parlatoria calianthina Berlese and Leonardi; Italy.
Parlatoria proteus virens Maskell; China, Japan, Formosa.
Aspidiothus (Pseudacoccus) boureyi Cockerell; St. Thomas.
Aspidiothus tayabanus Cockerell; Philippine Islands.

THYSANOPTERA.

*Heliothrips rubrocinetus Giard; West Indies, Ceylon, Uganda, Florida. (See Fruit.)

COLEOPTERA.

Buprestidæ.
Agrilus viridis Linnaeus; Europe; breeds in stalks. (See Oak.)

Chrysomelidæ.
Haltica querectorum Foudr.; Europe; attacks tea rose. (See Oak.)

Cerambycidæ.
Vesperus strepens Fabricius; France. (See Grape.)

Brachyrhinidæ.
Diaprepes abbreviatus Linnaeus; West Indies. (See Sugar cane.)

LEPIDOPTERA.

Geometridæ.
Anisopteryx ascellaria Schiffermiller; Europe; feeds on foliage.
Hibernia defoliaria Linnaeus; Europe; defoliator.
Boarmia gemmaria Brahni; Europe. (See Grape.)

Lasiocampidæ.
Malacosoma neustria Linnaeus; Europe; defoliator.

Lymantridæ.
Dasychinia pudibunda Linnaeus and Euproctis chrysothoe Linnaeus; Europe; defoliators. (See Forest defoliators.)

Notodontidæ.
Phaleria bechata Linnaeus; Europe. (See Forest.)

Tortricidæ.
Notocelia roborana Treitschke; Europe. (See Gooseberry.)

Pyralidæ.
*Pionea ferrugalis Hübnner; Europe, Asia, North America. (See Cabbage.)

HYMENOPTERA.

Cephilidæ.
Janus luteipes Lep., sawfly, boring in stems; Europe.

Argidæ.
Arge roseæ Linn., sawfly feeds on foliage; Europe.

LITERATURE.


ROYAL PALM.

(Oreodoxa regia. Family Palmaeæ.)

An American palm of magnificent growth. (See Palms.)

RUBBER.

See Balota gutta percha; Fig (Ficus spp.); Ceara rubber; Panama rubber; Para rubber; Silk rubber; West African rubber.
A DESTRUCTIVE RICE GRASSHOPPER.

The rice grasshopper (Hieroglyphus banian): a, Eggs; b-g, immature stages; h, adults; i, female laying eggs. (Maxwell-Lefroy.)
The Rice Root Grub.

Rice root grub (*Phyllognathus dionysius*): a, Eggs; b, c, c', larvae; d, d', d'', pupae; e, e', adults. (Maxwell-Lefroy.)
The rice case-bearer (Nymphula depunctalis): a, Larva; b, pupa; c, pupa in cocoon; d, adult; e, larva feeding, in cases; f, f', cocoon stems; g, g', larval cases. (Maxwell-Leffroy.)
The rice skipper (Parnara mathias): a, Eggs; b, larva webbing leaf; c, full grown larva; c', pupa; d, d', d'', adults; e, e', puparia of Tachinid flies; f, Ichneumonid parasite; g, g'', Tachinid parasite. (Maxwell-Leffroy.)
RUTABAGA.

See Turnip.

RYE.

*(Secale cereale* Linnaeus. Family Gramineae.)*

This species as well as its near relatives is cultivated in Europe and Asia. For full treatment of its insect pests, see Grains and grasses.

SAGO PALM.

*(Cycas revoluta.* Family Cycadaceae.)*

A palm-like plant of the Orient, much used in this country at funerals. (See Palms.)

SAL.

*(Shorea spp.* Family Dipterocarpaceae.)*

Valuable timber trees of India.

IMPORTANT SAL INSECTS.

**COLEOPTERA.**

**Scarabaeidae.**

*Serris annamensis* Brenske; India; adults defoliate and larvae attack the roots of *Shorea robusta.*

*Leptidota bicamata* Saunders; India; adults feed on foliage of *Shorea robusta.*

*Phyllaphaga problematica* Brenske (*Lechnosterna*), and *P. clypealis* Brenske; India; adults defoliate and larvae attack the roots of *Shorea robusta.*

*Heteroptera varians* Olivier; India; breeds at roots of *Shorea robusta.*

**Cucujidae.**

*Leptomphalus testaceus* Fabricius; India; breeds under the bark of felled trees of *Shorea robusta.*

**Bostrichidae.**

*Schistocera anoboides* Waterhouse; India; bores in trees of *Shorea robusta.*

*Heterobostrichus pileatus* Lesne, and *H. azucalis* Waterhouse; India; bore in timber of *Shorea robusta.*

*Sinozylon crassum* Lesne; India; a serious borer in the wood *Shorea robusta.*

*Sinozylon anale* Lesne; India; bores in *Shorea robusta.*

**Buprestidae.**

*Acmaeodera stictipennis* Laporte et Gory; India; bores in *Shorea robusta.*

*Chrysobothris scutptata* Gory; India; bores in the bark, bast, and sapwood of branches of *Shorea robusta.*

*Peilohtera viridans* Kerremans; India; bores in *Shorea robusta.*

**Elateridae.**

*Acanthophorus annamensis* Olivier; India; bores in logs of *Shorea robusta.*

**Tenebrionidae.**

*Setenia laxis* Fairmaire, and *S. semivalga* Blair; India; bore in *Shorea robusta.*

**Cerambycidae.**

*Acanthophorus serraticornis* Olivier; India; tunnels bast and sapwood of *Shorea robusta.*

*Cocosterna scabrata* Fabricius; India; bores in sapwood of *Shorea robusta.*

*Platiderus obeus* Gahan; India; bores in *Shorea robusta.*

*E. olivaceus* Olivier; India; bores in *Shorea robusta.*

*Dialyes pauper* Pascoe; India; bores in bast and sapwood felled and sickly trees of *Shorea robusta.*

*Hyposerchis indicus* Gahan; India; bores in sapwood of *Shorea robusta.*

*Hoplocerambys spinicornis* Newman; India; bores in wood of sickly or felled trees of *Shorea robusta.*

*Xylotrechus smeii* Lap. et Gory; India; bores in *Shorea robusta.*

**Cossidae.**

*Coranthurus jansoni* Wollaston; India; bores in timber of *Shorea robusta.*

*Humitutum asperum* Marshall; India; bores in *Shorea robusta.*

**Ipidae.**

*Sphaxonotrypes annamensis* Stebbing, *S. globulus* Blandford, *S. siwalikensis* Stebbing, *Cococotrypes integer* Eichhoff, and *Dryococetes minor* Stebbing; India; make galleries in wood and bark of *Shorea robusta.*


*Xylotrechus andrewesii* Blandford; India; bores in *Shorea salata.*

27812—18—13
A MANUOI OF DANGEROUS INSECTS.

**Lepidoptera.**

**Geometridae.**
- Boarmia sclanaria; India; feeds on young growth, leaves, and flowers.

**Lasiocampidae.**
- Suana concolor; India; defoliator.
- Tratala vishnu; India; defoliator.
- Dasychira horsfeldi; India; defoliator.
- Leucoma diaphana; India; defoliator.

**Lymantridae.**
- Lymantria grandis, L. lipcha, and L. brittata; India; defoliators.

**Lymantria.**
- Leucoma diaphana: India; defoliator.

**Lymantria grandis, L. lipcha, and L. brittata; India; defoliators.**

**Literature.**
- Stebbing, E. P. Indian Forest Insects, Coleoptera, 1914.

**Sapodilla.**

*(Sideroxylon [Achrus] sapota. Family Sapotaceae.)*

A fruit-bearing tree of the West Indies, central America, and northern South America cultivated in southern Florida.

**Important Sapodilla Insects.**

**Diptera.**

**Trypetidae.**
- Ceratitis capitata Wiedemann. (See Fruit.)
- Anastrepha ludens Loew; Mexico. (See Fruit.)

**Silk Cotton.**

*(Bombax malabaricum. Family Malvaceae.)*

Tropical trees. The bark of some species produces commercial fiber.

**Important Silk Cotton Insects.**

**Hemiptera.**

**Coccidae.**
- Aspidoprocus gigantus Newstead; Africa; Ceiba bombaxi.

**Coleoptera.**

**Bostrychidae.**
- Heterobostrichus exquisita Waterhouse; India; bores in the wood.

**Lepidoptera.**

**Lymantridae.**
- Dasychira horsfeldi; India; defoliator.

**Noctuidae.**
- Mudaria cornifrons; India; breeds in the pods.

**Literature.**
- Stebbing, E. P. Indian Forest Insects, Coleoptera, 1914.
- Stebbing, E. P. Manual of Forest Zoology for India, 1908.

**Silky Oak.**

*(Grevillea robusta. Family Proteaceae.)*

A valuable lawn tree with fine fern-leaved foliage, indigenous to Australia, but now cultivated in Florida and California.
INSECTS OF SILKY OAK, SILK RUBBER, SISSU, SORGHUM.

IMPORTANT SILKY OAK INSECTS.

Hosts: Silky oak (Grevillea robusta), and kauri (Agathis australis).
Injury: Bores in wood and is easily transported in logs.
Description: A beautiful grayish weevil about 0.75 inch long, with brown and pinkish markings, humeri and apical declivities of elytra acute angulate or toothed, thorax and elytra tuberculate.
Distribution: Queensland, Victoria.


Xenocnema spinipes (Wallach) australiae Lea.

Species: Acridocephala bistriata Chevrolat; East and West Africa; Funtumia elastica. Moecha adusta Har.; West and East Africa; cacao, Funtumia. Phryneta hecphora Thoms.; Kamerun, East Africa; Funtumia elastica. Phryneta caca Chevrolat; Kamerun; Funtumia elastica.
Injury: Bore in the wood.


SISSU.

(Dalbergia sissoo. Family Leguminosae.)

A tree of India, furnishing a very desirable timber. It is cultivated in California.

IMPORTANT SISSU INSECT.

LEPIDOPTERA.

Noctuidae.

Plecoptera refexa Guenée; India; defoliator.

SORGHUM; KAFIR; DURRA; BROOM CORN.

(Holcus sorghum Linnaeus. Family Gramineae.)

Owing to the large number of useful varieties of this species throughout the world there is more or less commerce in the seed for propagation purposes at least. The dangers of importing injurious insects would consist mainly in the shipments of seed, although it is conceivable that boring insects might be introduced in brooms.
IMPORTANT SORGHUM INSECTS.

LEPIDOPTERA.

Pyralidae.

_Chilo simplex_ Butler; India, Formosa. (See Sugar cane.)
_Chilo auricilia_ Dudgeon; India. (See Rice.)

Noctuidae.

_Sesamia erctica_ Led.; Sudan; attacks durra. (See Sugar cane.)

SOY BEAN.

(*Glycine hispida* Maxim. Family Leguminosae.)

The soy bean was introduced into this country from the Orient. Care should be taken to see that seed pests are not introduced.

AN IMPORTANT SOY-BEAN PEST.

_Laspeyresia glycinivorella_ Matsumura (Grapholitidae).

*Host:* Soy bean.
*Injury:* Breeds in the pods; very injurious.
*Description and biology:* Similar to that of _L. nebritana_ on peas.
*Distribution:* Japan.


SPINACH.

(*Spinacia oleracea.* Family Chenopodiaceae.)

An annual herb originating in Asia, now much cultivated for its edible foliage.

AN IMPORTANT SPINACH INSECT.

DIPTERA.

_Athomyiidae._

†_Chortophila_ (Pegomya) _hyoscyami_ Panzer (spinach leafminer). (See Beets.)

SPRUCE.

(*Abies* spp., _Picea* spp. Family Pinaceae.)

Ornamental evergreen trees of the cold and temperate zones of the northern hemisphere, highly valued for shade, parking, wind breaks, and hedges, and valuable for timber. For convenience the insect pests are arranged under Conifers.

STRAWBERRY.

(*Fragaria* spp. Family Rosaceae.)

Low vines bearing delicious fruit, cultivated in Europe, and America especially.

IMPORTANT STRAWBERRY INSECTS.

HEMIPTERA.

_Aphididae._

_Macrosiphum fragariae_ Koch; Europe; sucks juices.
_Macrosiphum fragariellum_ Theobald; Europe.
_Macrosiphum rogersii_ Theobald; England.

_Pentatomidae._

_Dindymus versicolor_; Australia; injurious.

COLEOPTERA.

_Carabidae._

_Harpalus ruficornis_ Fabricius; Europe; attacks fruit.
_Pterostichus vulgaris_ Linneus; Europe; a wingless beetle, attacks fruit and also feeds on angleworms.
INSECTS OF STRAWBERRY, SUGAR BEET, SUGAR CANE.

Chrysomelidae.
*Galerucella tanella* Linneus; leaf beetle; Europe; sometimes causes serious damage, larvae and adults feed on leaves.

Brachyphthididae.
*Brachypterus tenedricus* Herbst; Europe; larva feeds at roots, adults destroy buds and leaves. Several species of this genus have been introduced into the United States.

Brachypterus phisticus Fabricius; pitchy-legged weevil; Europe; injures strawberry, raspberry, pea, turnip, kale, ferns, potted plants.

Curculionidae.
*Anthonomus rubi* Herbst; Europe; larva attacks roots and runners, and adults destroy blossoms, buds and leaves.

*Rhinaria perdix* Pascoe; Australia.

Lepidoptera.

**Psychidae.**

*Psyche viacula* Schiffermiller; Europe.

**LITERATURE.**

**ORMEROD, E. A.** Injurious Insects during 1897, pp. 111–112, 1898.


**CUBITS, JOHN.** Farm Insects, p. 383.

(See Beet.)

**SUGAR BEET.**

**SUGAR CANE.**

*(Saccharum officinarum* Linneus. **Family Gramineae.**)

Sugar cane is an important product of the Southern States, Hawaii, Porto Rico, and the Philippines. It is grown in many parts of the world. Owing, however, to the great danger of transporting insect enemies in the seed cane, its importation into the United States, except through the Department of Agriculture, has been forbidden. There is still a great possibility of the spread of its enemies from outside into the islands. Some very important cane insects also attack corn. The sugar cane is host to a multitude of insects which feed on its foliage, suck its juices, or bore in its stems or roots. Many of these insects are not very likely to be imported, but in view of such a possibility are briefly mentioned.

**A. SUGAR-CANE INSECTS LIKELY TO BE IMPORTED.**

**Tetranychus exsiccator** Zehntner.

*Host:* Sugar cane.

*Injury:* Sucks juices from the plant.

*Description and biology:* A tiny red mite similar in structure and habits to our common red spider, *Tetranychus bimaculatus*.

*Distribution:* Java.


**Tomaspis varia** Fabricius; **Tomaspis postica** Walker; **Tomaspis lepidior** Font.

*(Sugar-Cane Frog Hoppers. **Cercopidae; Hemiptera.**)*

*Hosts:* Sugar cane, corn, grasses.

*Injury:* *Tomaspis varia* is a serious pest in Trinidad; damage called "blight" consists of withering of leaves and stunting of stem.

*Description and biology:* Adult *Tomaspis varia*, leafhopper 6–9 mm. long, with broad front wings; head and prothorax greenish, front wings brown with two yellow bands; undersides dark with sutures pinkish. The adults are not active in the daytime. They fly or hop when disturbed. *Nymphal* stages whitish with pink tinge,
completely covered by spittle within which they suck on the juices of the plant. Eggs elongate, oval, laid separately in incisions in dead or withering cane leaves. The other two species are similar to T. varia. (See plate xliii.)

Distribution: T. varia, Trinidad; T. postica, Mexico; T. lepidior, Panama.

Urich, F. W. Board of Agriculture, Trinidad and Tobago. Cir. 9, 1913, 45 pp., 9 pls., 7 text figs.

**Perkinsiella saccharicida** Kirkaldy.

(Sugar-Cane Leafhopper. Fulgoridae; Hemiptera.)

Host: Sugar cane.

**Injury:** Very serious drain on the vitality of the plant due to sucking of the juices. Liable to transportation on seed cane.

**Description and biology:** A small yellowish leaf hopper differing in the various stages mainly in the development of the wing pads. Eggs laid in slits in the epidermis of the leaves and stalks of cane. The insect in all stages sucks the juices of the plant. (See plate xliii.)

Distribution: Hawaii, Australia. A large number of this species were captured in quarantine in shipments received at Washington from Hawaii.


**Stenocranus saccharivoros** Westwood.

(West Indian Cane Fly. Fulgoridae; Hemiptera.)

Host: Sugar cane.

**Injury:** Very serious drain on vitality of plant due to sucking juices. Liable to transportation on seed cane.

**Description and biology:** A little yellow leafhopper differing but little in the various stages. It is not often a serious pest but at times does much damage. (See text fig. 94.)

Distribution: West Indies.


**Entochlora lateralis** Boheman. (**Holaniara piceces** Fairmaire).

(The Bibitkever. Tenebrionidae; Coleoptera.)

**Hosts:** Sugar cane, tobacco.

**Injury:** Bores in the stalks, causing much damage. It can easily be transported in seed cane.

**Description and biology:** Adult beetle about 6 mm. long, black, with a brown metallic luster on the elytra. *Pupa* white, oval, acute at apex with many spiny tubercles on sides of abdomen. *Larva* an elongate brown wireworm with pointed apex, 10-11 mm. long. Bores in the stalks of cane near the nodes, and also bores in tobacco stems. *Eggs* less than 1 mm. long, oval, almost spherical.

Distribution: Java.


Apogonia destructor Ritsema Bos.  

*Hosts:* Sugar cane, grasses, and various plants.  
*Injury:* Destructive in Java. Attacks the roots.  
*Description and biology:* Adult about 0.5 inch long, greenish black, of the general form of a June beetle. *Pupa* white, broad in front, tapering behind, with all appendages beneath. *Larva* white, usually in a curved position, with large yellow head and long legs. Lives at roots of plants, causing much damage.  
*Distribution:* Java.


Apogonia ritsema Sharp.  

*Hosts:* Sugar cane, and other plants.  
*Injury:* Destructive to the roots.  
*Description and biology:* Adult reddish brown to blue-black. Somewhat smaller than *A. destructor*. Length 5-7 mm. Immature stages also similar. The larvae are very destructive to the roots.  
*Distribution:* Java.

Van Deventer, W. Handboek voor de Suikerriet-cultuur, Java, 1906, pp. 32, 33, pl. 5.

Phytalus smithi Arrow.  

*Hosts:* Sugar cane.  
*Injury:* Larva trims the small roots and is liable to transportation in the soil around cane plants.  
*Description and biology:* Adult beetle tawny red of the shape and appearance of a June beetle, 14-18 mm. long. *Pupation* occurs in a cell in the ground. *Larva* a white grub, usually curved, with large brownish head, and long legs; bores in the sugar-cane stumps. *Eggs* laid in the soil.  
*Distribution:* Mauritius, Barbados, Trinidad. Has been distributed in cane shipments.  


Aphanisticus consanguineus Ritsema Bos.  

*Host:* Sugar cane.  
*Injury:* Mines the leaves.  
*Description and biology:* Adult beetle, 3.5 mm. long, black, head and prothorax with a bronzy tint. *Pupa* 3-5 mm. long, orange color, elongate elliptical, with all appendages beneath. *Larva* when full grown about 6 mm. long, orange colored, elongate, flattened, with sides crenulate. *Eggs* laid singly in the leaf.  
*Distribution:* Java.


Hispawackeri Zehntner.  

*(Sugar-Cane Hispid Miner. Chrysomelidæ; Coleoptera.)*  
*Hosts:* Sugar cane.  
*Injury:* Mines the leaves of sugar cane.  
*Description and biology:* Adult beetle 5-6 mm. long, black, bristling with strong spines. *Pupa* cylindrical, yellow or red brown in color, 6-7 mm. long, formed in...
the leaf mine. Larva yellowish white, flattened, legless, with small brown head, brown prothoracic shields, and two apical teeth. Mines the leaves.

Distribution: Java.

Van Deventer, W. Handboek voor de Suikerriet-cultuur, Java, 1906, pp. 66-70, pl. 9.

**Diaprepes abbreviatus** Linnaeus (spengleri Linnaeus).

(West Indian Sugar-Cane Root Borer. Brachyrhinidæ [Otiorthynchidæ]; Coleoptera.)

**Hosts:** Sugar cane, orange, guava, avocado, mango, rose, Indian corn, Guinea corn, sweet potatoes, Bahama grass (*Cynodon dactylon*), limes, and other plants.

**Injury:** The larva does serious injury to the roots and the adult to the foliage. Liable to transmission in seed-cane shipment.

**Description and biology:** Adult 8-18 mm. in length; variable in color from white to green and ochraceous, with from four to many denuded elytral striae; beak thick, tricarinate, antennæ elbowed. **Pupa** 19 mm. long, soft and white with a long thick beak. **Larva** long, white, curved, footless. **Eggs** oblong, oval, smooth, white, laid in clusters on leaves and glued between two leaf surfaces. The larvae feed at the root system and tunnel the stalk of the plants above named.

**Distribution:** Porto Rico to Barbados. (See plate xlvii.)

**Metamasius hemipterus** Linnaeus.

(Host: Sugar cane. Injury: Serious pest to the stalks of cane. Liable to importation in seed cane. Description and biology: Adult weevil about half an inch long, brown with dark markings on the thorax and elytra. The head is prolonged into a long beak. **Pupa** white with appendages folded beneath. It is formed inside a cocoon of fiber. **Larva** pale yellow, with brownish head, legless, wrinkled in appearance with the hind part of the body swollen; bores downward in the cane stalk. **Eggs** laid singly beneath the rind of the stalk or in the leaf sheaths.

**Distribution:** West Indies, Trinidad.


**Metamasius sericeus** Olivier.

(Host: Sugar cane. Injury: Serious pest to cane stalks. Liable to importation in seed cane. Description and biology: Very similar in general appearance and habits to *Metamasius hemipterus* Linnaeus. (See text fig. 95.)

**Distribution:** West Indies.
The sugar-cane froghopper *Tomaspis varia*: Eggs, and egg punctures. (Urich.)
THE SUGAR-CANE LEAFHOPPER (PERKINSIELLA SACCHARICIDA). (KIRKALDY.)
Cane Borers.

Cane borers. Figs. a, g, m, s.—Chilo simplex: Eggs, larva, pupa, adult. Figs. b, h, i, n, r.—Scirpophaga auriflua: Egg, larva, pupa, adults. Fig. g.—Scirpophaga monostigma: Adult. Figs. c, f, i, o.—Nonagria uniformis: Larva, pupa, adults. Figs. d, j, p.—Polyocha saccharella: Larva, pupa, adult. Figs. e, k.—Anerasia ablutella: Larva, adult. (Maxwell-Lefroy.)
THE SUGAR-CANE LEAF-ROLLER.

The sugar-cane leaf-roller (Omodes accepta): Fig. 1.—Adult. Figs. 2, 3, 4, 5.—Larva. Figs. 6, 7.—Pupa. Figs. 8, 9.—Eggs. Figs. 10, 11.—Injury. (Swezey.)
Rhabdocnemis obscurus Boisduval.

(Hawaiian Sugar-Cane Borer. Calandridse; Coleoptera.)

Hosts: Banana, sugar cane, coconut, sago palm, royal palm, wine palm (*Coryota urens*), papaya (*Carica papaya*).

Injury: Very injurious to the stalk. Liable to importation in seed cane.

Description and biology: Adult weevil reddish brown with darker brown markings, long beak, elbowed antennæ, over 0.5 inch long. *Pupa* white, in cocoon of fiber. *Larva* white, curved, legless. Bores in the stalks and roots. (See text fig. 96.)

Distribution: Hawaii, Jamaica, Barbados, St. Kitts, Antigua, St. Lucia, British Guiana, Fiji, New Guinea, New Ireland, Tahiti, Queensland, Malay Archipelago.

Xyleborus perforans Wollaston.

(Sugar-Cane Ambrosia Beetle. Scolytidae; Coleoptera.)

Hosts: Sugar cane, a polyphagous insect breeding in many kinds of wood.

Injury: Is very injurious to sugar cane in Java. As it bores in the stalks it can easily be transported in shipments of seed cane.

Description and biology: Adult weevils about 2 mm. long, cylindrical, without snout, the head completely concealed from above. Pupa white, about 2 mm. long with head and all appendages on the underside. Larva cylindrical, white, legless, with chitinized head. Bores in the pith of the stalk. Eggs elliptical. About 70 to 100 eggs are laid by the parent, each at the end of a separate chamber.

Distribution: Java, cosmopolitan in the tropics and subtropics.


Fig. 97.—Cane-sucker moth (Castnia lieus). (Ballou.)

Castnia lieus Drury.

(Cane-Sucker Moth: Giant Sugar Cane Borer. Castniidae; Lepidoptera.)

Hosts: Sugar cane, banana, coconut, orchids, and Bromeliaceae.

Injury: Very serious borer in cane stalks. When cane is to be imported from sections where this species occurs great care should be used to eliminate trash. Only the tops should be shipped, and these should be carefully examined for eggs or larvae at the base of the leaves.

Description and biology: Moth measuring over 3 inches in wing expanse, brown with a white band crossing each wing and a few yellow spots beyond. Pupa reddish brown, over an inch in length. Larva whitish, about 2 inches long, with reddish brown head. Bores in the stalks of its food plants. Eggs laid singly, pinkish, elongate, pointed at each end, ribbed, in cross section formed like a five-pointed star. Over 50 eggs are laid by each moth. (See text fig. 97.)

Distribution: British Guiana, Dutch Guiana, Trinidad, and other parts of northern South America.

Urich, F. W. The Cane Sucker. 2 pp., with colored plate.

Sesamia cretica Led.

(Durra Stem Borer. Noctuidae; Lepidoptera.)

Host: Sugar cane, corn, durra.
Injury: Very serious pest in Khartoum. Is liable to importation in seed cane.

Description and biology: Adult, a stout bodied, creamy colored moth, with wing expanse of about 30 mm.; hind wings silvery white; forewings creamy with faint brownish markings. Pupa 15-18 mm. long, chestnut colored. Larva 25-30 mm. long, varying from pinkish or yellowish to dead white; head brown, spiracles black. Egg white, 6 mm. in diameter. While this pest is more important as an enemy of durra and maize in Khartoum it is more likely to transportation in sugar cane.

Distribution: Khartoum, Sudan.

King, H. H. Third Report Wellcome Research Laboratory Khartoum, 1904, pp. 222-224; pl. 27, figs. 1, 3, 6, in color.

Diatrea spp.

(Sugar-Cane Borer Moths. Pyralidae; Lepidoptera.)

Species: *Diatrea saccharalis* Fabricius; Mexico, West Indies, United States. *D. striatalis* Sn.; West Indies, Java. *D. canella* Hampson; Trinidad, Grenada, Guiana. *D. lineolata* Walker; Trinidad, West Indies, Central America, South America.

Hosts: Sugar cane and grasses.

Injury: Very serious injury by boring in the stalk. Easy to transport in seed-cane shipments.

Description and biology: Gray moths with whitish-spotted larvae. Pupate in the stalks in the larval tunnels. Eggs are laid in clusters. *Diatrea saccharalis* has been fully treated in American literature. The others behave in a similar manner.


Van Deventer, W. Handboek voor de Suikerrietcultuur, Java, 1906, pp. 131-139, pl. 20.

Chilo simplex Butler.

(Sugar-Cane Moth Borer of India. Pyralidae; Lepidoptera.)

Hosts: Sugar cane, corn, sorghum, rice, millet.

Injury: Very serious pest, boring in the stalks. It is liable to importation in seed cane.

Description and biology: Moth yellowish gray, the male a little smaller and darker. Pupation occurs in the larval tunnel. Larva about an inch long, with a dirty white body and black head, a dark patch behind head and two dark longitudinal lines on body. The small hairs of the body are set on black dots. The larva burrows in the stalks of cane, corn, sorghum, rice, and millet. Eggs laid in rows, side by side on the leaves. (See plate xliv, figs. a, g, m, s.)

Distribution: India, Ferrosa.


Omiodes accepta Butler.

(Hawaiian Sugar-Cane Leafroller. Pyralidae; Lepidoptera.)

Hosts: Sugar cane, grasses, sedges.

Injury: Feeds on the leaves, which it rolls for its protection. The damage is sometimes serious. Is liable to importation in seed cane.
Description and biology: Adult, brownish with white-lined veins and margins of segments; wings with two darker bands; antennæ long. Wing expanse 20–30 mm. 
Pupa 12–14 mm. long, light brown. Larva 27 mm. long, green with a few scattered hairs; head pale yellowish. The larva feeds on the leaf, folding it into a tube to protect itself while feeding, changing to a new leaf when it has eaten all it can. When disturbed it drops to the ground. Eggs laid in small clusters arranged in rows on the surface of leaves. (See plate xlv.)

Distribution: Hawaii, Peru.

Swezey, Otto H. Hawaiian Sugar Planters' Assn., Bull. 5, pp. 6-10, pl. 1.

Polycha saccharae Dudgeon.

(Cane Root Borer. Pyralidae; Lepidoptera.)

Hosts: Sugar cane.

Injury: Causes stunted growth and shriveling of plants by boring in stalks and roots. Description and biology: Moth small, brown, with hind wings white. Pupates in stalk. Larva about 0.75 inch in length, of white color; bores in stalk and root; hibernates in root; before pupating it eats an opening in the stem and covers it with silk. (See plate xliv, figs. d, j, p.)

Distribution: India.


Ereunetis flavistriata Walsingham.

(Sugar-Cane Bud Moth. Tineidae; Lepidoptera.)

Hosts: Sugar cane, palms, banana, pineapple, Pandanus.

Injury: While this species mainly lives in the dead tissues of the above food plants, it breeds in cane stalks among the dry leaves, but often eats out the eyes or buds, thus destroying the propagating value of the cane. It may easily be transported in seed cane.

Description and biology: A small moth, measuring 14 mm. in wing expanse, head and thorax yellowish white, forewings yellowish white, with indistinct yellow streaks, hind wings shining pale golden yellow, becoming white at apex. Pupa 5 to 6 mm. long, pale yellowish brown. Larva 12 to 15 mm. long, whitish, head reddish brown, hairs on darker tubercles. The larva usually feeds in the dried leaf sheaths, but sometimes attacks the rind, giving entrance to fungi, and does the greatest damage by eating out the eyes.

Distribution: Hawaii.

Swezey, Otto H. Hawaiian Sugar Planters' Association, bul. 6, pp. 9-12, pl. 2, figs. 1-6.

Laspeyresia schistaceana Sn. (Grapholitha).

(Gray Borer of the Sugar cane. Tortricidae; Lepidoptera.)

Hosts: Sugar cane.

Injury: Very important in Java. Is liable to importation in seed cane.

Description and biology: Moth about 12 mm. long, grayish brown. Pupa reddish brown, 8–13 mm. long. Larva yellowish, with head and collar on prothorax as well as two apical segments chitinized reddish brown. Hairs sparse on brownish spots. The larva bores in stalks of the cane. Eggs oval; about 120 to 170 are laid in a row under the leaf or behind the sheath of the cane.

Distribution: Java.

Van Deventer, W. Handboek voor de Suikerriet-cultuur, Java, 1906, vol. 2, pp. 142-150, pl. 21, text figs. 46–49.

B. OTHER IMPORTANT SUGAR-CANE INSECTS.

ORTHOPTERA

Acrididae and Locustidae.

*Oxya intricata* Stål of Formosa and Japan; *O. velox* Fabricius of China, Japan, India, and Islands of the Pacific Ocean; *O. annulicornis* Matsumura of Formosa; attack foliage.

*Epacromia tamulus* Fabricius and *Trilophidia annulata* Thunberg; Java; attack foliage.

*Racilis okinawensis* Matsumura of Formosa.

*Gelastorhinus esox* Burr of Japan and Formosa.


*Pachytylus migratorolides* Reicharting, an especially serious pest in Formosa, Asia, Africa, and Australia; *Cedaleus infernalis* Saussure of Japan, China, Formosa, India, and Malaysia; *O. nigrfasciatus* Latreille of Asia, Europe, and Africa.

---

Fig. 98.—Cane grasshopper (*Atractomorpha crenulata*). (Maxwell-Lefroy.)

*Atractomorpha crenulata* Fabricius (See text, fig. 98) and *A. psittacina* De Haan of Java; *A. bedeli* Bolivar of Japan, China, and Formosa.

*Elimna chloris* De Haan, *Mecopoda elongata* Linnaeus; Java.

*Tryzalis nasuta* Linnaeus of Formosa, Asia, Africa, and Europe; *Phleoba infumata* Brun, of Formosa, China, and Malaysia; *Stenobothrus formosanus* Matsumura of Formosa; *Trilophidia annulata* Thunberg and *Epacromia tamulus* Fabricius of Asia and the Islands of the Pacific; *Paratettix gracilis* Shiraki, *P. singularis* Shiraki, *Hedotettix arcuatus* Shiraki, and *Tettix formosanus* Shiraki of Formosa.

Gryllidae, Gryllotalpidae.

HEMIPTERA.

Coccidae.

Armored—

*Aspidiotus (Odonaxis) secreta socharicaeulx Zehntner; Java.*

*Aspidiotus (Tarsonix) glomerata Green; India.*

*Aspidiotus (Tarsonix) sacchari Cockerell; West Indies, Java, British Guiana.*

*Chionaspis depressa Zehntner; Java, India.*

*Chionaspis madangensis Zehntner; Java.*

*Chionaspis saccharifoli Zehntner; Java.*

*Chionaspis tangatensis Zehntner; Java, Mauritius.*

Unarmored—

*Aclerda japonica Newstead; India.*

*Asterolecanium bambusze Boisduval; Madeira.*

*Icerya seychellam* Breddin; Java, Papua, New Guinea;

*Pseudococcus brouilletii Bouché; Hawaii.*

*Pseudococcus calcicolariz Maskell; Hawaii, St. Croix, Porto Rico, Barbados.* (See pl. XLVI.)

*Pseudococcus sacchari Cockerell; Costa Rica, Hawaii, Porto Rico, Barbados, Cuba.*

*Pseudococcus saccharifoli Green; Hawaii.*

*Pseudococcus texensis Tinsley; Texas, Mauritius.*

*Pulicaria icrpy Guérin; Mauritius, Formosa.*

*Rhipesia sacchari Guénée; India.*

---

Jassoidea, Fulgoroidea.


*Phenicus maculatos* Westwood, *Diconamtopia vastatrix* Breddin, and *Eumetopina krugeri* Breddin; Java.

The leafhoppers of the genus *Perkinsella* seem to be partial to sugar cane, sometimes attacking grasses. Aside from *P. socharicaeulx* Kiralydy, treated above, the following species are recorded by *Muir: P. vittatis* Kiralydy, Fiji; *P. grammicrola* Kiralydy, Hawaii; *P. sinensis* Kiralydy, Borneo; *P. pallidulus* Muir, Borneo; *P. rattacli* Muir, British New Guinea; *P. bicololar* Muir, British New Guinea; *P. variegata* Muir, British New Guinea; *P. papuanes* Muir, British New Guinea; *P. vastatrix* Breddin, Java, Borneo, British New Guinea; *P. latokensis* Muir, British New Guinea; *P. ambohensis* Muir, Amboina. Owing to the habit of laying eggs in the cane stalks any of these species can be transported in cane shipments.
SUGAR-CANE INSECTS.

Cicadidae.
Mopanna hebes Walker; Java.

Aleyrodidae.
Neomyscelia bergy Signoret; Formosa, oriental regions.
Aleurolobus longicornis Zehntner, and Aleyrodes lactea Zehntner; Java.

Aphididae.
Oregma lanigera Zehntner; Formosa; very injurious.
Geleca tuerjuga Zehntner; Formosa.

Miridae (Capsidae).
Lygus oryzae Matsumura and L. sacchari Matsumura; Formosa.
Periscopus mundulus Breddin; Java.

Tingidae.
Serentia formosana Matsumura; Formosa.

Lygaeidae.
Cymnus tabaci Matsumura; Formosa.

Colabathricidae.
Coreus trigonus Thunberg, C. bipunctatus H. S., Riptortus fuscus Fabricius, and Leptocoris varicornis Fabricius; Formosa.

Pentatomidae.
Scolinophora tarsalis Vol., Menida histrio Fabricius, and Leptocoris varicornis Fabricius; Formosa.

THYSANOPTERA.

Philothrips striatoptera Kobus, Physopus sexnoiatus Zehntner, Oxythrips binervis Kobus, Parthenothrips (?) kobusi Van Deventer, Stenothrips (?) zehntneri Van Deventer, Thrips sacchari Krüger, T. serrata Kobus, T. minuta Van Deventer, and Phlaothrips lacerent Krüger; Java.

Pentatomidae.
Dinoderus minutus Fabricius; India. (See Bamboo.)

Sciaridae.
Oryges rhinocerus Linnaeus (see Palms), Xylopteryx dichotomus Linnaeus, and Ligyus rugiceps Le Conte; the destructive scarabaeids, whose larvae feed at the cane roots; oriental regions.

Xylopteryx gideon Linnaeus, Anomala xnea Perty, Adoretus umbrosus Fabricius (see Rose), and Holotrichia leucophthalma Wiedemann; the very destructive scarabaeids, whose larvae feed at the roots of cane; Java; oriental regions.

Holotrichia vidua; attacks cane in the Philippines.

Tenebrionidae.
Gonocophilum (Opatrum) acutangulum Fairmaire, which bores in sugar cane and tobacco stalks.

Elateridae.
Agriotes formosanus, A. taichuensis, A. sacchari, Eolus vittatus, Cardiophorus devastans, C. formosanus, Ludius suturalis, and Lactu shirakii, all described by Matsumura; Formosa and oriental regions.

Chrysomelidae.
Monolepta nigrobilineata Motschulsky; Coleaspidea metallica Rossi, a very injurious species; Nodostoma lateralis Matsumura and Hispa calicantha Baly; Formosa and oriental regions.

Brachyphilinae.
Echinocnemus sylaneus Billberg, Mylocrurus brunnaceus Matsumura, M. guttulus Matsumura, Epinotus albo-rubens Matsumura, Cneorhinus albiguttatus Matsumura, Phytophagus formosanus Matsumura, Tanymecus rusticus Fabricius (a very injurious species); Formosa.

Hypomeco us unicolor Fabricius, which breeds at the roots of young cane and also attacks rice; Java.

Curculionidae.
Liridet europa Fabricius; Formosa.
Baris saccharicola Matsumura; Formosa.

Calandridae.
Rhynchophorus palmarum Linnaeus; Trinidad. (See Coconut palm.)
Cosmopolites sordidus Germar; Pacific Islands. (See Banana.)
LEPIDOPTERA.

Rhopalocera.
Cytila leda Linnaeus, Discophora celinde Stoll, Pamphila dara Kollar, Hesperia philina Möschler, H. conjuncta H. S.; Java.
Parara mathias Fabricius and Telecota augias Linnaeus; Mycalesis minicus Linnaeus and Melanitis leda Linnaeus; Formosa and oriental regions.

Sphingidae.
Leucophila lineata Westwood; Formosa, Java.

Notodontidae.
Antica combusta Moore (Phalera); Java.

Cnethocampidae.
Dracta petola Moore; Java.

Arestidae.
Phissama interrupta Linnaeus; Java.

Lymantridae.
Psalis securs Hübner, Euproctis minor Snellenhoeven, Latia subrufa Snellenhoeven, Prodena adara Moore, and Aroa sorcus Hübner; Java.
Laella costalis Matsumura; Formosa.
Euproctis flavata Cramer; oriental regions.

Noctuidae.
Semaia nonagrioides Lef., Spodoptera pecten Guénée, Agrotis interjectionis Guénée, Remigia frugalis Fabricius (see text fig. 100); Java.
Nonagria cititosa Oliff is destructive to cane in New South Wales.
Nonagria inferens Walker, which is very injurious to cane in Formosa; Cirphis unipuncta Haworth, a cosmopolitan pest; and L. loreyi Dup; Formosa.
Nonagria uniformis; India. (See pl. XLIV, figs. c, f, i, o.)

Pyralidae.
Botys colecis Walker, Cnaphalocrocis bifurcatai Snellenhoeven, Scirpophaga intacta Snellenhoeven, and Chloasticha nana Zehntner; Java.
Chilo infuscataella Snellenhoeven, Scirpophaga auriflua Zeller, a serious borer (see pl. XXIV, figs. b, h, l, n, r), and Diatraea striatalis Snellenhoeven; Formosa and oriental regions.
Anocasta abietella Zeller; India; borer. (See pl. XLIV, figs. e, k.)
Chias auricilia Dudgeon; India. (See Rice.)
Scirpophaga chrysorrhora Zeller and S. monostigma Zeller (see pl. XLIV, fig. g); India; very injurious borers.

Elachistidae.
Cosmopteryx pallisacellia Snellenhoeven; Java.
Autosticha pelotes Meyrick breeds in dead cane leaves and other plants in Hawaii.

Tortricidae.
Eucoasma achiastceae Snellenhoeven; causes much injury by boring in the stems; Formosa.

Phyllidae.
Cryptoblabes aliena Swezey attacks green cane leaves, corn, and sorghum, as well as other plants.

Tineidae.
Excentis pilosata Swezey and E. muiricella Swezey of British New Guinea attack the cane exactly as E. flavistriata; Opoponia auriqueuamosa Butler of Hawaii, Marquesas, and Society Islands; O. apicntis Swezey of Hawaii; O. dimidiatella Zeller of Java; O. saccharella Swezey, and O. fumiceps Felder of New Guinea attack the wet dead leaves and lower buds of cane.

LITERATURE.

Muir, F. Hawaiian Sugar Planters' Assn., Entom. bul. 9, 1910, 11 pp., 5 figs.
The Sugar-Cane Mealy-Bug.

The sugar-cane mealy-bug *Pseudococcus calceolariae*:

Fig. 1.—Adult mealy-bugs clustered about base of young cane.

Fig. 2.—Adult females, enlarged.

Fig. 3.—Single adult with mealylike covering.

Fig. 4.—Cocoons. (Van Dine.)
The tobacco stem-borer *Gnorimoschema heliopa*; Figs. *a, b.*—Eggs. Figs. *c, e.*—Injury Fig. *d.*—Pupa. Fig. *f.*—Larva. Figs. *g, h.*—Adults. (Maxwell-Lefroy.)
SWEET POTATO.

(Ipomoea batatas Poir. Family Convolvulaceae.)

The sweet potato is now grown in many parts of the world, and, while not often shipped into the United States because of our own bountiful crops, there is always likelihood of danger in shipment of tubers for propagation purposes. The only enemies of the vine which are dangerous are those which attack the tubers.

A. Better known sweet-potato insects likely to be imported.

Cylas brunneus Fabricius.

(Liberian Sweet-Potato Borer. Curculionoidea: Coleoptera.)

Host: Sweet potato.

Injury: Attacks tubers in a manner similar to C. formicarius. Liable to introduction in the tubers.

Description: A wingless elongate weevil with body constricted in front of elytra; unicolorous, brown, bronzy or black, of the same form as C. formicarius.

Distribution: Liberia.

* Cylas formicarius Fabricius.

(Sweet-Potato Weevil. Curculionoidea: Coleoptera.)

Host: Sweet potato.

Injury: Very serious pest of sweet-potato tubers.

Description and biology: Adult an elongate weevil, with steel-blue elytra, reddish prothorax and legs and darker head; about 0.33 inch in length. Pupa white, elongate with all appendages folded underneath. Larva a white footless grub with dark-brown head; bores in the tubers of the sweet potatoes and pupates in its burrows. It attacks the tubers both in the field and in storage.

Distribution: Nearly cosmopolitan; Florida to Texas, but not present in all sweet-potato sections of the United States.

Basu, S. K., and Dutt, H. L. Crop Pest Handbook for Behar and Orissa, 1913, Calcutta, Leaflet 71, pl. 47.

Eusepes batatae Waterhouse. (Cryptorrhynchus.)

(West Indian Sweet-Potato Weevil. Curculionidae; Coleoptera.)

Host: Sweet potato.

Injury: Bores in the tuber. Very easily distributed. This weevil is caught in quarantine in almost every shipment of sweet potatoes from Hawaii to California but has not yet become established.

Description and biology: Weevil elliptical, brown, covered with flat scales and bristling with stiff erect scales; beak short, concealed on breast when at rest. Pupa white, oval with two apical spines. Larva curved, white, legless with chitinous head.

Distribution: West Indies (Barbados, Antigua), Hawaii.


Omphisa anastomosalis Guéneé.

(Sweet-Potato Stem Borer. Pyralidae; Lepidoptera.)

Host: Sweet potato, other garden crops.

Injury: Bores in the stem and sometimes into the tuber, in which case it can easily be disseminated.

27812—18—14
Description and biology: Moth white, with the body suffused with ocherous and rufous, leaving some pale spots on the dorsum; forewings with rufous suffusion on basal area extending below median nervure to middle of wing, hyaline patches at middle and end of cell, rufous edged ocherous spot between them, and another beyond cell, curved postmedial rufous line with irregularly dentate line beyond it inclosing series of hyaline patches; hind wings with base rufous, two irregularly waved rufous post-medial lines; expanse 32-36 mm. 

Larva 30 mm. long, pale yellowish white, with conspicuous brown tubercles. Eggs elliptical, flat or moderately rounded, laid on leaves.

Distribution: China, India, Ceylon, Java. Introduced into Hawaii about 1900 and has become quite a pest.


**B. IMPORTANT SWEET-POTATO INSECTS.**

**HEMIPTERA.**

**Jassidae and Fulgoridae.**

*Nesospis ipomoeola* and *Aloha ipomoeae*; Hawaii.

**COLEOPTERA.**

*Conchylodonta punctata* Fabricius; Africa; sometimes serious.

**Scarabaeidae.**

*A dorretus umbrosus tenuimaculatus* Waterhouse; Hawaii, Japan.

**Chrysomelidae.**

*Aspidomorpha militaris* Fabricius; India, Java; leaf beetle.

**LEPIDOPTERA.**

**Noctuidae.**


**Sphingidae.**

*Herse convolvuli* Linnaeus; Hawaii, United States.

**Tineidae.**

*Bedellia minor* Busck; Hawaii, Florida; leaf miner.

*Bedellia somnulentella* Zeller; Cosmopolitan.

*Bedellia orchilella* Walsingham, Hawaii; an important leaf miner.

**Pyralidae.**

*Phlyctenia despecta* Butler; Hawaii; leaf roller.

**Tortricidae.**

*Amorbia emigratella* Busck; South America, Hawaii; leaf roller.

**TAMARACK.**

**TAMARIND.**

*(Tamarindus indica* L. Family Leguminosae.)

An ornamental shade tree grown everywhere in the Tropics. It is grown in southern Florida and California and is used in conservatories in more northern countries. The pods contain a pleasant pulp used in the Tropics as a basis for a cooling drink. This pulp is also used in medicine. The wood is valuable for furniture.

**IMPORTANT TAMARIND INSECTS.**

**COLEOPTERA.**

**Mylabridae.**

*Coryphorus gonagra* Fabricius; India, breeds in seed.

**Calendridae.**

*Calendria linearis* Herbst; Brazil, West Indies.

*Calendria rugicollis* Casey, Key West, Fl.; breeds in seed in pod.

**Tenebrionidae.**

*Palaebus ocellarum* Casey; Key West, Fl.

Stebbing, E. P. Indian Forest Insects. Coleoptera, 1911.
TAMARISK.

(Tamarix spp. Family Tamariscaceae.)

Ornamental trees or shrubs occurring from Mediterranean regions to East Indies and Japan. Tamarix gallica is planted in many places on our Gulf coast. Several species have medicinal properties and yield dyestuffs. The punctures of Coccus manniparus cause Tamarix mannifera to produce "manna."

IMPORTANT TAMARISK INSECTS.

COLEOPTERA.

Curculionidae.

Coniatus latus Miller, and C. suavis Gyllenhal, Europe; breed on the leaves.

Nanophyes tamaricis Gyllenhal; Europe; breeds in the ovaries of Tamarix gallica.

Bargagli, P. Rassegna Biologica Rincofori Europei, 1883-87.

TEA.

(Thea sinensis. Family Ternstroemiaceae.)

The tea plant is a flowering shrub much valued for its leaves, which yield the universally used beverage. It occurs in China and India and is also propagated in this country. Other species of the genus are much prized as flowering shrubs.

A. BETTER KNOWN TEA INSECTS LIKELY TO BE IMPORTED.

Xyleborus fornicatus Eichhoffi. (Shot-hole borer of tea. Ipidae; Coleoptera.)

Host: Tea, coffee, cacao.


Description and biology.—Beetle oblong, shining, fuscos, 1-4 mm. long; larva develops into beetles in fallen twigs.

Distribution: Ceylon, Java, India.


Biston suppressarius Gn. (Indian Tea Geometrid. Geometridae; Lepidoptera.)

Hosts: Tea, Dodonea viscosa, Carissa diffusa, Bauhinia variegata, Acacia catechu, Acacia modesta, Rothra tinctoria, Cassia auriculata, Albizzia.

Injury: Serious as defoliator of tea and forest trees.

Description and biology: Moth, gray with black markings. Larva green. Has three broods a year.

Distribution: India.

STEBRING, E. P. Manual Forest Zoology, India, 1908, p. 133, fig. 267.

Psyche spp., etc. (Tea Bagworms. Psychidae; Lepidoptera.)

Species: Psyche albipes Moore; Ceylon; tea. Psyche ossamica Watt; India ea. Acanthopsyche reidi Watt; India; tea. Acanthopsyche snelleni Heyl; India; tea. Amatissa consorta Templeton; India, Ceylon; tea. Clania variegata Snell.; India, Ceylon, Java; tea, cinchona, coffee. Clania crameri Westwood; India; tea, cinchona, coffee, Pinus longifolia. Clania holmesi Wall; India; tea.

Injury: Feed on foliage, twigs, and bark.

Biology: The larvae feed in bags made from scraps of bark, etc.


B. OTHER IMPORTANT TEA INSECTS.

ACARINA.

Tetranychidae.
Tetranychus bioculatus Wood-Mason. (See Coffee.)

HEMIPTERA.

Coccidae.
* Florinia theca Green; cosmopolitan; tea, olive, etc. (See pl. V, fig. 1.)
* Orthococcus insignis Douglas; cosmopolitan; tea, citrus. (See pl. IV, fig. 2.)
* Coccus hesperidum Linnaeus; cosmopolitan; tea, citrus, palms. (See pl. II, fig. 2.)

Pulvinaria theca Froggat; Australia; Thea viridis. Coccus viridis Green; Ceylon, Hawaii.

LEPIDOPTERA.

Cossidae.
Zeuzera coffeae Nietner; borer. (See Coffee.)

Cocchidiidae.
* Belippe albiguttata Linnaeus; serious injury in Java.

Geometridae.
* Ophthalmodes cretacea Butler; Japan.

Lymantriidae.

Notodontidae.
Stauropterus alternus Walker; India, Ceylon, Java.

TEAK.

(Tectona grandis. Family Verbenaceae.)

A valuable timber tree of the Orient.

IMPORTANT TEAK INSECTS.

COLEOPTERA.

Cucujidae.
Siletanus edeana Walth.; India; breeds in leaves, forming galls, causing leaves to drop.

Malacocephalidae.
* Plateros dispallens Walker; India; oviposits in clusters on twigs; defoliates trees.

Buprestidae.
* Psilopterus fastuosus Fabricius; India; bores in wood.

Elateridae.
* Adelocera modesta Boisdau; India; bores in bast and sapwood.

Chrysomelidae.
* Aspidomorpha sanctae crucis Fabricius; India; a tortoise-shell beetle; defoliates.

Cerambycidae.
* Stromatium barbatum Fabricius; India; bores in wood of saplings. Stromatium longicorne Newman. India; a very serious borer. Gelonantha hirta Fairmaire and Xyloecus smei Lap. et Gory; India; bore in bast and sapwood.

Brachyrhinidae.
* Astynus lateralis Fabricius; India. Myloecrus viridanus Fabricius; India; a serious defoliator. Myloecrus carinistris Marshall and M. discolor variegatus Boheman; India. Cyrtipistomus pannosus Marshall; India; a defoliator as an adult.

LEPIDOPTERA.

Cossidae.
* Cosus cadambe; India; bores in wood of lopped trees. Duomitus ceramicus; India; bores in wood and is very destructive.

STEBBING, E. F. Indian Forest Insects, Coleoptera, 1914.
STEBBING, E. F. A Manual of Forest Zoology for India, 1908.
INSECTS OF TIMBER, TIMOTHY, AND TOBACCO.

TIMBER.

* Nacerdes metanura Linnaeus.

(Timber Beetle. (Edemeridae; Coleoptera.)

Host: Bores in wharf timber, creosoted and untreated piling, paving blocks, and pine flooring.

Injury: Reported as doing considerable damage at Auckland, New Zealand.

Description: Beetle 12 mm. long, elongate, subdepressed, brownish yellow or reddish, with yellowish pubescence; dilated sides of thorax, femora, tibiae, and tips of elytra blue or blackish. Pupa 16 mm. long, creamy colored, with two median and two lateral protuberances on apical segment. Larva 24 mm. long, cylindrical, tapering toward apex; creamy colored, front of head light brown; mandibles black; legs short; third and fourth abdominal segments swollen beneath and with two protuberances each; ninth abdominal segment somewhat bent, with transverse fissure at apex.

Distribution: Europe, introduced into New Zealand, Eastern United States.


TIMOTHY.

* Phleum pratense Linnaeus. Family Gramineae.

This grass is a native of Europe now extensively cultivated in America for hay. A discussion of its insect pests will be found under Grains and Grasses.

TOBACCO.

* Nicotiana tabacum Linnaeus. Family Solanaceae.

Tobacco is grown in many parts of the world and is a very important article of commerce in various forms. Commercial importations generally consist of manufactured products, loose leaf, stem, and seed. The greatest dangers lie in the manufactured products and loose-leaf tobacco. There are at present no quarantine restrictions on tobacco. The tobacco plant has many very important enemies in foreign countries, which are not extremely likely to enter the country in connection with tobacco shipments, but which should be guarded against. Many of these important insects are listed to assist in the work of identification.

A. BETTER KNOWN TOBACCO INSECTS LIKELY TO BE IMPORTED.

Aleyrodinae spp.

(Tobacco White Flies. Aleyrodidae; Hemiptera.)

Species: A. tabaci Gennadios; Greece; tobacco. (See text fig. 101.) * Trialeurodes vaporariorum Westwood, cosmopolitan; many hosts.
Injury: Suck juices from foliage; injure value of tobacco leaf.
Description: Adults tiny white flies.

KIRKALDY, G. W. Hawaii Bd. Comm. Agr. and Forestry; Bull. 2.

TARGIONI-TOZZETTI, Ad. Animali ed Insetti del Tabacco, 1891, pp. 246-249, fig. 86.

CATORAMA TABACI Guérin-Meneville.

(Tobacco Beetles. Anobiidae; Coleoptera.)

Hosts: Stored products.
Injury: Attacks dried tobacco.
Description and biology: Adult beetle ovate-discoidal, convex, brown, covered with whitish pubescence, about 5 mm. long. Larva similar to that of Lasioderma.
Distribution: Europe.

TARGIONI-TOZZETTI, Ad. Animali ed Insetti del Tabacco, 1891, pp. 92, 93.

AGRIOLES LINEATUS Linnaeus.

Hosts: Tobacco, grain, potatoes, beets, peas, clover, cabbage, hops, corn, carrots, lettuce, peach, etc.
Injury: Larvae tunnel the roots and sometimes stems.
Description and biology: Adult a snipping beetle 7-8 mm. long, brown with griseous pubescence; second and fourth elytral intervals blackish; antennae, anterior margin, and posterior angles of prothorax reddish brown. Larva elongate, chitinous wire-worms; feed in the roots and stems of plants and cause much damage.
Distribution: Europe, Asia, Africa.

TARGIONI-TOZZETTI, Ad. Animali ed Insetti del Tabacco, 1891, p. 81, figs. 30, 31.


AGRIOLES PILOSUS Lacordaire.

Host: Tobacco.
Injury: Larvae tunnel the plants.
Description and biology: Adult a snipping beetle, black, 12-14 mm. long. Larva 25 mm. long, chitinous, wireworm, feeds in the roots and stems.
Distribution: Bessarabia, Portugal.


TARGIONI-TOZZETTI, Ad. Animali ed Insetti del Tabacco, 1891, p. 82.

ATHOUS NIGER Linnaeus.

Hosts: Tobacco, beets.
Injury: Larvae tunnel the plants.
Description and biology: Adult a snipping beetle, shining black with cinereous pubescence; length 11-12 mm. Larva 18-20 mm. long; a wireworm which feeds in the roots of tobacco and other plants.
Distribution: Europe.


TARGIONI-TOZZETTI, Ad. Animali ed Insetti del Tabacco, p. 79.
TOBACCO INSECTS.

Gnorimoschema heliopa Low.

(Tobacco Stem Borer. Gelechiidae; Lepidoptera.)

Host: Tobacco.

Injury: Very injurious as a stem borer. Stems having swellings should be destroyed.

Description and biology: Adult moth small and brown with narrow fringed wings. Pupa stage is spent in stem. Larva, caterpillar bores into the leaf stem and bores downward in the stalk, causing a swelling to appear in two or three weeks. In cold weather this stage lasts 6 to 10 weeks. Eggs deposited singly upon leaves, stems, and stalks, usually upon the lower side of leaves or stems. In cold weather this stage lasts 2 or 3 weeks. Warm weather reduces the development from about a third to a half. (See plate xlvii.)

Distribution: Australia, Ceylon, India.


*Phytomyza affinis* Fallen (*nigricornis* Macquart).

(Phytomyza fly. Agromyzidae; Diptera.)

Hosts: Tobacco, Cineraria, Cosmos, Helianthus, Geranium, Dahlia, Chrysanthemum, marigold, nasturtium, lettuce, celery, carrot, parsnip, pea, cape weed, dandelion, etc.

Injury: Mines the leaves, destroying their value for high-grade products. Might be distributed in celery or tobacco.

Description and biology: Adult fly very tiny. *Pupa* is formed in leaf mine. Larva tunnels the leaf. Egg laid on under surface.

Distribution: Tasmania, New Zealand, Australia, Europe, United States.

Lea, A. M. Insect and Fungal Pests of the Orchard and Farm, Hobart, Tasmania, pp. 81-84.

B. OTHER IMPORTANT TOBACCO INSECTS.

ORTHOPTERA.

Gryllidae and Locustidae.

*Acridium migratorium* Fieber, and *Anisolabris maritima* Fieber; Europe.
*Atractomorpha crenulata* Fabrictius; India.
*Brachytrpes ochatinus* Stoll; Asia.
*Caeloptenus italicus* Burmeister; Mediterranean Regions.
*Chrotogonus trachypterus* Blanchard; India.
*Locusta viridissima* Fabrictius; Europe, Asia, Africa.
*Pachytus sulcicornis*; Transvaal.

Gryllotalpidae.

*Gryllotalpa gryllotalpa* L. (*vulgaris* Latreille); Europe.
*Gryllotalpa africana* Pal. B.; widely distributed.
*Schizodactylus monstrosus* Drury; Asia.

Miridae (Capsidae).

*Gallobellicus erassicornis* Distant; India.

Lygaeidae.

*Cymnus toby* Matsumura; Formosa.
*Nysius minor* Distant; India.

Pentatomidae.

*Nezara viridula* Linnaeus; Transvaal.

HEMIPTERA.

SCARABAEIDAE.

*Adoretus umbrosus* Fabrictius; Hawaii; feeds on leaves.
*Mélochôna vulgaris* Fabrictius of Europe; *M. rufipes* Herbst of Europe, Asia, Africa; *M. tenebrosus* Kiesenwetter, *M. nigro Fabricius; and *M. castantipes* Paykull; breed at roots of tobacco.
Scarabaeidae—Continued.
*Cetonia lugubris* Voet; Europe; breeds in tender bark above the ground, causing reddening of plant.
(See text fig. 102.)
*Pentodon punctatus* Kirby; Europe; Africa; larva destructive to roots.
*Oxythyrea funesta* Poda; Italy; damages leaves.

**Tenebrionidae.**
*Blaps mucronata* Latreille; Italy.
*Eutrichia lateralis* Boheman; Java. (See Sugar cane.)
*Gonocephalum intermedium* Fischer; Bessarabia; causes stunted growth by boring.
*Gonocephalum acutangulum* Fairmaire; Java; bores in stalks; *G. (Opatrum) pusillum* Fabricius; Europe; borer.
*Pedinus femoralis* Mulsant; Bessarabia.

**Curculionidae.**
*Cleonus punctiventris* Germar; Europe. (See Beet.)

**Lepidoptera.**
*Agrotis segetum* Schiffermiller (see text fig. 103) of Europe, *A. melanica* Cr. of Asia (see text fig. 104), *A. moorei* of Asia, *A. lineola* Fabricius of India and Ceylon; cutworms.
*Laphygma reclusa*; Orient.
*Chloridea pcltigera* Schiffermiller, and *C. assulta* Guenee; India.
*Euxoa spinifera* Hübner; Europe, Asia, Africa, *Mamestra brassicae* Linneaus and *M. albicolor* Hübner; Italy.

**Gelechiidae.**
*I: Phthorimexa operculida* Zeller. (See Potato.)

Fig. 102.—Tobacco beetle (*Cetonia lugubris*). (Targioni-Tozzetti.)

*Micronima olivia*; Cuba, leaf roller on tomato, tobacco, and eggplant.
*Ptisia gamma* Linneaus; Europe, and *P. argentinifera* Tasmania.
*Prodenia litura* Fabricius; Asia, Africa, Australia. (See text fig. 105.)
*Spodoptera mauritia* Boisduval, and *Triphaga pronuba* Linneaus; very widely distributed. (See text fig. 106.)

**Fig. 103.—Tobacco cutworm (*Agrotis segetum*); Adult. (Targioni-Tozzetti.)

**Literature.**
LINDEMAN, K. VON. Die Schädlichsten Insekten des Tabak in Bessarabia, 1888. Moscow
MAXWELL-LEFROY, H. F. Indian Museum Notes, Vol. 3.
VARIOUS AUTHORS in Memoires Dept. Agr. India, Entomological Series.
HOWARD, C. W., in Transvaal Agricultural Journal during 1907 and 1908.
INSECTS OF TODDY PALM AND TOMATO.

TODDY PALM.
(Phoenix sylvestris. Family Palmaeæ.)

A palm much cultivated in India for its sap, which yields sugar and "toddy." (See Palms.)

TOMATO.
(Lycopersicum esculentum. Family Solanaceæ.)
The much-prized garden fruit grown very extensively in this country.

A. BETTER KNOWN TOMATO INSECTS LIKELY TO BE IMPORTED.

Desiantia nociva Lea.

(Tomato Weevil. Curculionidæ; Coleoptera.)

Host: Tomato, potato, and other vegetable plants.

Injury: Larvae and adults feed on and destroy the plants. They are nocturnal feeders, hiding in the soil by day.

Description: Weevil elongate, about 12 mm. long, brown with black dots. Larva pea green in color. Pupates in cell in soil.

Distribution: Australia.


Lonchæa splendida.

(Metallic Tomato Fly. Trypetidæ; Diptera.)

Hosts: Tomato, potato, eggplant, other Solanaceæ.

Injury: Breeds in fruit, attacking perfectly healthy tomatoes.

Description: Fly, metallic bluish green or dark bronze green, wings smoky pink, head and legs black, body tapering, eyes large and prominent.

Distribution: New Zealand, Australia, Pacific Islands.

B. OTHER IMPORTANT TOMATO INSECTS.

LEPIDOPTERA.

Gelechidæ.

*Phthorimæa operculella* Zeller. (See Potato.)

Noctuidæ.

*Micromima oliviosa*: Cuba; leaf roller on tomato, tobacco, and eggplant.

TRYPETIDÆ.

*Ceratitis capitata* Wiedemann; attacks fruit. (See Fruit.)

Diptera.

*Decus cucurbitæ* Coquillett; India, Ceylon, Hawaii; attacks fruit. (See Cucurbits.)

Fig. 104.—Tobacco cutworm (*Amsacta lactinea*): Adult. (Maxwell-Lefroy.)

Fig. 105.—Tobacco cutworm (*Prodenia litura*): Larva, pupa, adult. (Maxwell-Lefroy.)
A MANUAL OF DANGEROUS INSECTS.

TOON.

(Cedrela toona, etc. Family Meliaceae.)

Tall ornamental trees of the Tropics; some species cultivated in California and the Gulf States.

AN INSECT INJURIOUS TO TOON.

LEPIDOPTERA.

Pyralidae.

Hypsipyla robusta Moore; India; bores in flowers, buds, fruit, and twigs of toon (Cedrela toona).


TROPICAL ALMOND.

(Terminalia spp. Family Combretaceae.)

Tropical plants, chiefly of the Old World, some of them with edible seed. T. catappa is cultivated in Florida and Porto Rico.

IMPORTANT TERMINALIA INSECTS.

THYSANOPTERA.

‡ Heliothrips rubrocinclus Giard; West Indies, Ceylon, Uganda, Florida. (See Avocado.)

COLEOPTERA.

Bostrychidae.

Sinoxylon crassum Lesne; India; bores in wood of Terminalia tomentosa. T. chbula.

Sinoxylon anale Lesne; India; bores; in wood of Terminalia belerica.

Lyctus spinifrons Lesne; India; bores; in posts of Terminalia tomentosa.

Buprestidae.

Polyphaga viridans Kerremans; India; bores in wood of Terminalia tomentosa.

Chrysochroa indica Cast. et Gory; India; bores in wood of Terminalia tomentosa.

Cerambycidae.

Eulethes boloscrica Fabricius; India; bores in wood of Terminalia tomentosa.

Fig. 106.—Tobacco cutworm (Triphaena pronuba): Adult. (Targioni-Tozzetti.)

Brentidae.

Coecephalus carus Walker; India; bores in wood of Terminalia tomentosa.

Platypodidae.

Platypus cupulatus Chapuis; India; bores in wood.

DIPTERA.

Trypetidae.

Ceratitis capitata Wiedemann; attacks Terminalia catappa. (See Fruit.)

Stebbing, E. P. Indian Forest Insects, Coleoptera, 1914.

TURNIP; RUTABAGA.

(Brassica rapa, Brassica campestris. Family Cruciferae.)

These root crops will bear watching for root pests.

IMPORTANT TURNIP INSECTS.

Meligethes aeneus Fabricius.

(Turnip Flower Beetle. Nitidulidae; Coleoptera.)

Hosts: Turnip, rape, cabbage, and other crucifers.

Injury: Does considerable damage to the buds and flowers, causing stunted and shriveled appearance.
Description and biology: Adult metallic green, sometimes with a bluish shimmer; sides parallel, head and apex rounded, legs dark brown; fore tibiae lighter, small externally saw-toothed; body 2-2.5 mm. long, 1.5-2 mm. broad. Larva yellowish white, head dark; mandibles with darker apex and a double row of short teeth; length 4.5 mm. During the first week in June the beetles may be found in numbers in blossoms, apparently feeding on the pollen. The eggs are deposited within the unopened buds. The larvae feed in the buds and flowers and cause stunting and shriveling. Pupation takes place in earthen cells.

Distribution: Europe.


Xnchocera hiemalis.

(Winter Turnip Gnat. Mycetophilidae; Diptera.)

Hosts: Turnip, cabbage.

Injury: Is found in connection with injury to roots of these crops, especially where a fungus disease known as “club,” “anbury,” etc., is present. There is a possibility that the gnat might be concerned in the spread of the fungus.

Distribution: England.

Ormerod, E. A. Sixteenth Rept. Injurious Insects, 1892, pp. 147, 148.

Athalis spinarum Fabricius.

Hosts: Crucifers, turnips, beets, etc.

Injury: Defoliates.

Biology: Eggs laid in the leaves. Larve feed on the leaves. Pupates in earthen cocoon.

Jablonowski. Tier. Feinde d. Zuckerrübe, pp. 298-303, fig. 60.

VIBURNUM.

(Viburnum spp. Family Caprifoliaceae.)

Ornamental shrubs, including the black haw, the snowball, laurustinus, and many other desirable garden plants. They occur in America, Europe, Africa, Asia, and Java.

IMPORTANT VIBURNUM INSECTS.

Hemiptera.

Cocccidae:

Armored—

*Aspidiotus (Chrysomphalus) persea Comstock; Mexico, England (Kew Gardens), Florida.
*Aspidiotus spinosus Comstock; Italy; Viburnum tinus.
*Chionaspis salicis Linnaeus; Europe.
*Parlatoria myrtus Maskell; South Australia.
*Chionaspis (Phenacaspis) cugunix Maskell; Australia, China, Japan, Ceylon, Hawaii.

Unarmored—

*Lichtenia viburni Signoret; France, England, Wales, Massachusetts.
*Pseudococcus viburni Signoret; France, Maritime Alps.
*Solenococcus muratae Kuwana; Japan.

WALNUT AND BUTTERNUT.

(Juglans spp. Family Juglandaceae.)

Hardy nut-bearing trees of Europe, Asia, and America. The nuts are all edible. The trees are valuable for shade and the wood is very valuable for furniture. The husks of the nuts are sometimes used for medicinal purposes or for tanning.
A MANUAL OF DANGEROUS INSECTS.

IMPORTANT WALNUT INSECTS.

HEMIPTERA.

Coccidae.

Armed—

Aspidiotus (Diaspidiotus) juglandis Colvée; Spain; Juglans regia.
Diaspis leperrii Signoret; Europe; Juglana cinerea, J. regia.

Unarmed—

Lecanium coryli Linnaeus; Juglans nigra, J. regia.

COLEOPTERA.

Cerambycidae.

Cerambyx cerdo Linnaeus; Europe; bores in wood. (See Oak.)
Oberea linearis Linnaeus; Europe; bores in pith of nursery stock. (See H.).
Saperda scalaris Linnaeus; Europe; bores in wood and bark.

Curculionidae.

Magdalis carbonaria Linnaeus; Europe; bores in trunks. (See Birch.)
Aelides porrectirostris Marshall; India; breeds in nuts of Juglans regia.

LEPIDOPTERA.

Cossidae.

Cossus cossus Linnaeus; goat moth; Europe; bores in wood. (See Willow.)

Tortricidae.

Laspeyresia splendana Hübner; Europe. (See Chestnut.)
Laspeyresia grossana Haworth; Europe. (See Beech.)
Laspeyresia amplana Hübner; Europe. (See Hazel.)


WATERCRESS.

(Roripa nasturtium.)

A hardy market crop grown in moist soil, ditches, and water courses.

AN IMPORTANT WATERCRESS INSECT.

Limnophilus flavicornis Fabricius.

(Watercress Caddis Worm. Limnophilidae; Trichoptera).

Hosts: Water cress, Lemna.

Injury: The larvae feed on the leaves.

Biology: The larvae are concealed in cases and live under water. The eggs are laid in gelatinous masses and are sometimes retained for a while at the extremity of the female's body, but are finally attached to some aquatic plant.

Distribution: England.


WATERMELON.

WHEAT; EMMER; SPELT.

(Triticum sativum Lam. and Triticum spp. Family Gramineæ.)

Wheat is grown in many parts of the world and is a standard article of commerce. The principal manner in which its insect enemies may be transported is in shipments of the grain, although the occasional use of straw in packing would be liable to introduce stem-infesting insects. The greater part of the world's wheat crop is grown in Europe. For full treatment of its insect pests see Grains and grasses.
WILLOW INSECTS.

(Walix spp. Family Salicaceae.)

Important trees along waterways in Europe and America. The wood is used in the manufacture of gunpowder and for many other purposes. Certain species are cultivated for materials with which to manufacture baskets.

A. BETTER KNOWN WILLOW INSECTS LIKELY TO BE IMPORTED.

Crepidodera aurata Marsh.

(Willow Leaf Beetle. Chrysomelidae; Coleoptera.)

Hosts: Willow, Populus laurifolia, P. alba.

Injury: Feeds on foliage.

Distribution: Throughout Europe.

Phyllodecta spp.

(Willow Leaf Beetles. Chrysomelidae; Coleoptera.)

Species: P. vitellinae Linnaeus; Europe, Connecticut (introduced); willows (Salix purpurea, etc.), poplar. P. vulgatissima Linnaeus; Europe; willows (Salix viminalis, etc.). P. tibialis Suffrian.; Europe; willow.

Injury: Feed on foliage in adult and larval stages.


Cossus cossus Linnaeus.

(Goat Moth. Cossidae; Lepidoptera.)

Hosts: Willow, poplar, alder, elm, oak, birch, linden, walnut, scotch pine, ash, beech, maple.

Injury: Bores in trees to the heartwood. Very serious, kills many trees.

Description and biology.—Adult, male wing expanse 68-75 mm., female 75-90 mm.; stout and clumsy, clothed with dense gray hairs, forewings dark gray and brown, with dusky transverse streaks; hind wings ash gray to grayish brown with some indistinct brown marks; antennae fringed with gray. Occurs June and July and flies at dusk.

Pupa, rich brown in color, with three rings of spines around abdomen. Pupation occurs in larval galleries; requires about a month. Larva, length 75-100 mm., dirty ochre-yellow, with broad, median dorsal, mahogany-red stripe; head blackish brown two deep-brown spots on first thoracic segment. Larval period about 3 years; tunnel in wood, occasionally leave trees. Eggs, brown, round, convex above, flattened below, ribbed; deposited in groups of 15 to 50 in crevices of bark; each female deposits 200 to 300 eggs, which hatch in about 10 days. (See text fig. 107.)

Distribution: Europe, Syria, Korea, North Africa.

Theobald, F. V. Insect Pests of Fruit, 1909, p. 42.


Rhabdophaga spp.

(Willow Gall Midge. Ionidiidae [Cecidomyiidae]; Diptera.)

Species: *R. nielsonii* Kieffer; Denmark; willow. *R. saliciperda* Dufour; Europe; willow; *Populus alba*. *R. salis Schrck.; Europe; Salix purpurea.*

Injury: Bore in wood and form gall-like formations.

Description and biology: *R. nielsonii* with head and thorax beneath yellowish red, thorax dark brown above; abdomen red; length 3 mm.


B. OTHER IMPORTANT WILLOW INSECTS.

ACARINA.

Eriophyidae.

*Eriophyes tetanothrix* Nalepa, blister mite; England; attacks leaves of *Salix caprea*.

HEMIPTERA.

Aphididae.

*Lachnus vivialis* Fonsc., plant louse; Germany; attacks shoots of *Salix vivialis*.

Coccidae.

**Armored**

- *Aspidiotus (Tarqionia) distincta* Leonardi; Europe.
- *Chionaspis salicis* Linnaeus; Europe.

**Unarmored**

- *Lecanium ciliatum* Douglas; Europe.
- *Lecanium corpii* Linnaeus; Europe.
- *Phenacoccus acris* Signoret; Europe.
- *Pulicaria betulae* Linnaeus; Europe.

COLEOPTERA.

Anobiidae.

*Ptilinus fuscus* Geoffroy; Europe; bores in dead wood of standing living trees.

*Ptilinus pectinicornis* Linnaeus; Europe; bores in wood.

Buprestidae.

*Agrius ceciquotatus* Brahm., Europe; bores in bark.

*Porechionota variolosa* Paykull; Europe; bores in bark.

Searabidae.

*Amphialion solstitialis* Linnaeus; Europe; larva attacks roots of shoots.

*Melolontha hippocastani* Fabricius and *M. melolontha* Linnaeus; Europe; larva attacks roots of seedlings.

Cerambycidae.

- *Coleodes saris* Solsky; India; bores in trunks of *Salix alba* and *S. babylonica*.
- *Aromia moschata* Linnaeus; Germany; bores in stems and old cuttings.
- *Lamina tector Linnaeus*; Europe; bores in larger cuttings and shoots.
- *Obera ovata* Linnaeus; Europe; bores in pith of twigs and stems.
- *Phymatodes lividus* Rossi; Germany; particularly injurious to baskets; also, attacks felled trees and lumber.
- *Superta carcaris* Linnaeus, *S. populin* Linnaeus; Europe; bore in bark and wood. The latter species occurs on the Pacific coast of the United States.

Chrysomelidae.

*Haltica quercetorum* Foudr.; Europe; leaf beetle (see Oak); *H. ameloophaga* Guérin; Europe, Africa (see Grape).

*Melasoma populi* Linnaeus; India; defoliator on *Salix elegans* and *S. babylonica*.

Curculionidae.

*Doratoplus affinis* Paykull; *D. agnathus* Boheman, *D. doralis* Herbst, *D. maculatus* Marsham, *D. majalis* Paykull; Europe; the eggs are laid in the buds in the fall, and the larvae develop in the flowers in the spring.

*Oreosorus decoratus* German; Europe; mines the leaves of *Salix triandra*, *S. viridis*, *S. fragilis*, and *S. purpurea*.

*Oreosorus populi* Fabricius; Europe; mines the leaves of *Salix vivinals*, and *S. triandra*.

*Cryptorrhynchus lapathi* Linnaeus; Europe, eastern United States; breeds in the stems and twigs.
INSECTS OF WILLOW AND YEW.

LEPIDOPTERA.

Cossidae.
Zeuzera pyrina Linnaeus; Europe; bores in wood of basket willow. (See Horse-chestnut.)

Cymblidae.
Earis chlorana Hübner; Europe; attacks foliage, buds, and shoots of long-leaf willows.

Geometridae.
Anisoplia montana Schiffermiller; Europe; feeds on foliage.
Larentia dilutaata Borckh.; Europe; defoliator.

Lasiocampidae.
Eriogaster laevis Linnaeus and Malacosoma neustria Linnaeus; Europe; defoliators.
Gastropacha quercifolia Linnaeus; Europe. (See Fruit.)

Lymantridae.
*Euproctis chrysorrhoea* Linnaeus, *Lymantria monacha* Linnaeus, *Porthetria dispar Linnaeus*, *Orgyia antiqua Linnaeus, Porthesia similis Fuessly*, and *Stilpnias salicis Linnaeus*; Europe; defoliators. (See Forest defoliators.)

Sesiidae.
Sesia formiciformis Esp.; Europe; bores in stems and shoots.

HYMENOPTERA.

Cimbicidae.
Cimbei variabilis Klug; Europe; sawfly, attacks leaves.
Pseudoclavellaria amerixa Linnaeus; a sawfly; Europe; defoliator.
Trichosoma lucorum Linnaeus; Europe; defoliator.

Tenthredinidae.
Euura ater Jurine, Pontania salicis Christ, and Pteronidea salicis Linnaeus; Europe; sawflies.

Diptera.

Itionidae (Cecidomyidae).
Cecidomyia saliciperda Dufour; Europe; breeds in branches of Salix triandra, S. alba, S. fragilis S. caprea, and S. purpurea.
Cecidomyia salicis Schrank; Europe; breeds in shoots.

LITERATURE.

Nüsslin, O. Leitfaden der Forst insects, 2d ed., 1913.
Hess, R. Der Forstschutz, 1900, vol. 2.
Steding, E. P. Indian Forest Insects, Coleoptera, 1914.
Bargagli, P. Rassegna Biologica Rinelofori Europei, 1883-87.
Lindenger, B. Die Schillldäuse (Cocidae), 1912.

YEW.

(Taxus spp. Family Taxaceae.)

Ornamental evergreen trees or shrubs distributed throughout the northern hemisphere. The wood is valued for cabinetmaking. In studying the pests of this genus reference should also be made to Conifers.

Eriophyes psilaspis Nalepa.

*Host:* Yew.

*Injury:* Forms gall-like swellings of the buds. Serious injury to hedges.

*Description and biology:* Four-legged blister mite, which causes galls by its feeding. Especially liable to introduction on nursery stock.

*Distribution:* England.

THE WEST INDIAN SUGAR-CANE ROOT WEEVILS.
Figs. 1, 2, 3.—Varieties of Diaprepes abbreviatus. (Mene.)
THE AVOCADO WEEVIL (HEILIPUS LAURI). (BARBER, PROC. ENT. SOC. WASHINGTON.)
<table>
<thead>
<tr>
<th>INSECT INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abraxas grossulariata</strong></td>
</tr>
<tr>
<td><strong>Acanthocinus adalis</strong></td>
</tr>
<tr>
<td><strong>Acanthodyla erythrocephala</strong></td>
</tr>
<tr>
<td><strong>Acanthophorus serraticornis</strong></td>
</tr>
<tr>
<td><strong>Acanthopsycha reidi</strong></td>
</tr>
<tr>
<td><strong>Acanthoscelides obtectus</strong></td>
</tr>
<tr>
<td><strong>Acarina</strong></td>
</tr>
<tr>
<td><strong>Acherontia atropos</strong></td>
</tr>
<tr>
<td><strong>Acheta bimaculata</strong></td>
</tr>
<tr>
<td><strong>Achidia heraclei</strong></td>
</tr>
<tr>
<td><strong>Aclerda distorta</strong></td>
</tr>
<tr>
<td><strong>Acrissodera stictipennis</strong></td>
</tr>
<tr>
<td><strong>Acrisius vulgaris</strong></td>
</tr>
<tr>
<td><strong>Acrisius flavicornis</strong></td>
</tr>
<tr>
<td><strong>Acridium hieroglyphicum</strong></td>
</tr>
<tr>
<td><strong>Adelocera modesta</strong></td>
</tr>
<tr>
<td><strong>Adoretus umbrosus</strong></td>
</tr>
<tr>
<td><strong>Adoxus obscurus</strong></td>
</tr>
<tr>
<td><strong>Aenara levis</strong></td>
</tr>
<tr>
<td><strong>Alesthes holosericea</strong></td>
</tr>
<tr>
<td><strong>Aellopos vitattus</strong></td>
</tr>
<tr>
<td><strong>Aethes notabilis</strong></td>
</tr>
<tr>
<td><strong>Agenasia alni</strong></td>
</tr>
<tr>
<td><strong>Agrilus angustulus</strong></td>
</tr>
<tr>
<td><strong>Agrilus betuleti</strong></td>
</tr>
<tr>
<td><strong>Agrilus biguttatus</strong></td>
</tr>
<tr>
<td><strong>Agrilus elongatus</strong></td>
</tr>
<tr>
<td><strong>Agrilus serratus</strong></td>
</tr>
<tr>
<td><strong>Agrilus sinuatus</strong></td>
</tr>
<tr>
<td><strong>Agrilus subauratus</strong></td>
</tr>
<tr>
<td><strong>Agrilus viridis</strong></td>
</tr>
<tr>
<td><strong>Agrilus aterrimus</strong></td>
</tr>
<tr>
<td><strong>Agrilus aterrimus formosanus</strong></td>
</tr>
<tr>
<td><strong>Agrilus aterrimus lineatus</strong></td>
</tr>
<tr>
<td><strong>Agrilus obscurus</strong></td>
</tr>
<tr>
<td><strong>Agrilus pilosus</strong></td>
</tr>
<tr>
<td><strong>Agrilus sacchari</strong></td>
</tr>
<tr>
<td><strong>Agrilus taichuensis</strong></td>
</tr>
<tr>
<td><strong>Agrilus fabalis</strong></td>
</tr>
<tr>
<td><strong>Agrilus frontalis</strong></td>
</tr>
<tr>
<td><strong>Agromyza maura</strong></td>
</tr>
<tr>
<td><strong>Agromyza phaseoli</strong></td>
</tr>
<tr>
<td><strong>Agromyza simplex</strong></td>
</tr>
<tr>
<td><strong>Agrotis sp</strong></td>
</tr>
<tr>
<td><strong>Acrisius viridis</strong></td>
</tr>
<tr>
<td><strong>Acrisius subauratus</strong></td>
</tr>
<tr>
<td><strong>Acrisius viridis</strong></td>
</tr>
<tr>
<td><strong>Acrisius betuleti</strong></td>
</tr>
<tr>
<td><strong>Acrisius biguttatus</strong></td>
</tr>
<tr>
<td><strong>Acrisius elongatus</strong></td>
</tr>
<tr>
<td><strong>Acrisius sinuatus</strong></td>
</tr>
<tr>
<td><strong>Acrisius subauratus</strong></td>
</tr>
<tr>
<td><strong>Acrisius viridis</strong></td>
</tr>
<tr>
<td><strong>Acrisius aterrimus</strong></td>
</tr>
<tr>
<td><strong>Acrisius aterrimus formosanus</strong></td>
</tr>
<tr>
<td><strong>Acrisius aterrimus lineatus</strong></td>
</tr>
<tr>
<td><strong>Acrisius obscurus</strong></td>
</tr>
<tr>
<td><strong>Acrisius pilosus</strong></td>
</tr>
<tr>
<td><strong>Acrisius sacchari</strong></td>
</tr>
<tr>
<td><strong>Acrisius taichuensis</strong></td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>212</td>
</tr>
<tr>
<td>208</td>
</tr>
<tr>
<td>120</td>
</tr>
<tr>
<td>192, 223</td>
</tr>
<tr>
<td>102</td>
</tr>
<tr>
<td>215</td>
</tr>
<tr>
<td>12, 199</td>
</tr>
<tr>
<td>24, 105, 131, 138, 154, 170, 179</td>
</tr>
<tr>
<td>46, 207</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>127, 190</td>
</tr>
<tr>
<td>102</td>
</tr>
<tr>
<td>93</td>
</tr>
<tr>
<td>46</td>
</tr>
<tr>
<td>73</td>
</tr>
<tr>
<td>68</td>
</tr>
<tr>
<td>50, 187</td>
</tr>
<tr>
<td>179</td>
</tr>
<tr>
<td>87</td>
</tr>
<tr>
<td>23, 170</td>
</tr>
<tr>
<td>18, 170</td>
</tr>
<tr>
<td>23, 170</td>
</tr>
<tr>
<td>174</td>
</tr>
<tr>
<td>47, 197</td>
</tr>
<tr>
<td>170</td>
</tr>
<tr>
<td>87</td>
</tr>
<tr>
<td>87</td>
</tr>
<tr>
<td>63</td>
</tr>
<tr>
<td>208</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>67</td>
</tr>
<tr>
<td>30, 56, 63, 166, 179</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>67</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>43</td>
</tr>
<tr>
<td>5, 43</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>95</td>
</tr>
<tr>
<td>95</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>57</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>87</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>145</td>
</tr>
<tr>
<td>145</td>
</tr>
<tr>
<td>87</td>
</tr>
<tr>
<td>154</td>
</tr>
<tr>
<td>12, 39, 46</td>
</tr>
<tr>
<td>199</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>83, 84</td>
</tr>
<tr>
<td>192</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>73</td>
</tr>
<tr>
<td>6, 55, 84, 91</td>
</tr>
<tr>
<td>192</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>134, 175</td>
</tr>
<tr>
<td>70</td>
</tr>
<tr>
<td>82</td>
</tr>
<tr>
<td>83, 84</td>
</tr>
<tr>
<td>132, 175</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>208</td>
</tr>
<tr>
<td>222</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>181</td>
</tr>
<tr>
<td>181</td>
</tr>
<tr>
<td>15, 16</td>
</tr>
<tr>
<td>181</td>
</tr>
<tr>
<td>15, 16</td>
</tr>
<tr>
<td>5, 35</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>98</td>
</tr>
<tr>
<td>163</td>
</tr>
<tr>
<td>162</td>
</tr>
<tr>
<td>139</td>
</tr>
<tr>
<td>152</td>
</tr>
<tr>
<td>152</td>
</tr>
<tr>
<td>169</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>162, 219</td>
</tr>
<tr>
<td>162, 219</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>Insect Index</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Boll worms (see Diparopsis castanea; Earias spp.; Scadodes pyralis)</td>
</tr>
<tr>
<td>Bostrychopsis jussuita</td>
</tr>
<tr>
<td>paralata</td>
</tr>
<tr>
<td>Bostrychus caudatus</td>
</tr>
<tr>
<td>Bothynoderus furmosus</td>
</tr>
<tr>
<td>punctiventris</td>
</tr>
<tr>
<td>Boþs caesaris</td>
</tr>
<tr>
<td>Brachonyx pini</td>
</tr>
<tr>
<td>Brachycerus albidenatus</td>
</tr>
<tr>
<td>coryana</td>
</tr>
<tr>
<td>pradieri</td>
</tr>
<tr>
<td>undatus</td>
</tr>
<tr>
<td>Brachyderes incanus</td>
</tr>
<tr>
<td>tusitanicus</td>
</tr>
<tr>
<td>Brachythinus (Otiorthynchus spp.)</td>
</tr>
<tr>
<td>armadillo</td>
</tr>
<tr>
<td>armatus</td>
</tr>
<tr>
<td>aspaltinus</td>
</tr>
<tr>
<td>aurifer</td>
</tr>
<tr>
<td>corruptor</td>
</tr>
<tr>
<td>egregius</td>
</tr>
<tr>
<td>fullo</td>
</tr>
<tr>
<td>fusipes</td>
</tr>
<tr>
<td>globus</td>
</tr>
<tr>
<td>infquat</td>
</tr>
<tr>
<td>jucris</td>
</tr>
<tr>
<td>kratteri</td>
</tr>
<tr>
<td>larigatus</td>
</tr>
<tr>
<td>lopidea</td>
</tr>
<tr>
<td>niger</td>
</tr>
<tr>
<td>orbicularis</td>
</tr>
<tr>
<td>oratus</td>
</tr>
<tr>
<td>perdis</td>
</tr>
<tr>
<td>picipes</td>
</tr>
<tr>
<td>populeti</td>
</tr>
<tr>
<td>raucus</td>
</tr>
<tr>
<td>sensiticos</td>
</tr>
<tr>
<td>septenriornis</td>
</tr>
<tr>
<td>singularis</td>
</tr>
<tr>
<td>subculatus</td>
</tr>
<tr>
<td>tenebricasus</td>
</tr>
<tr>
<td>teretirostris</td>
</tr>
<tr>
<td>tristis</td>
</tr>
<tr>
<td>turca</td>
</tr>
<tr>
<td>Brachytrypes achatinus</td>
</tr>
<tr>
<td>Brachytrytus subsignatus</td>
</tr>
<tr>
<td>Brazil fig borers (see Helipus bonelli)</td>
</tr>
<tr>
<td>Broad-nosed grain weevil (see Oudophilus latinaus)</td>
</tr>
<tr>
<td>Bromius obscurs</td>
</tr>
<tr>
<td>citis</td>
</tr>
<tr>
<td>Brontiasa froggatti</td>
</tr>
<tr>
<td>Brown's fruit fly (see Dacus [Typhricle] zanthodes)</td>
</tr>
<tr>
<td>Brown hard-back beetle (see Phylotus smitik)</td>
</tr>
<tr>
<td>plum owlet moth (see Xyliina socia)</td>
</tr>
<tr>
<td>Brown-tail moth (see Euproctis chrysorrhoea)</td>
</tr>
<tr>
<td>Bruchus (see Mylabris spp.)</td>
</tr>
<tr>
<td>Brush spinner (see Orapia gonostigma)</td>
</tr>
<tr>
<td>Bryobia ribis</td>
</tr>
<tr>
<td>Bud stinger (see Janns compressa)</td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Page</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>207</td>
</tr>
<tr>
<td>207</td>
</tr>
<tr>
<td>13</td>
</tr>
<tr>
<td>24, 15</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>82</td>
</tr>
<tr>
<td>152</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>95</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>153</td>
</tr>
<tr>
<td>102</td>
</tr>
<tr>
<td>210</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>211</td>
</tr>
<tr>
<td>211</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>166</td>
</tr>
<tr>
<td>89</td>
</tr>
<tr>
<td>165</td>
</tr>
<tr>
<td>170</td>
</tr>
<tr>
<td>49</td>
</tr>
<tr>
<td>123</td>
</tr>
<tr>
<td>131</td>
</tr>
<tr>
<td>63</td>
</tr>
<tr>
<td>63</td>
</tr>
<tr>
<td>207</td>
</tr>
<tr>
<td>164</td>
</tr>
<tr>
<td>153</td>
</tr>
<tr>
<td>153</td>
</tr>
<tr>
<td>153</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>43</td>
</tr>
<tr>
<td>155</td>
</tr>
<tr>
<td>34, 207</td>
</tr>
<tr>
<td>208</td>
</tr>
<tr>
<td>212</td>
</tr>
<tr>
<td>12, 27, 46, 96, 141, 148, 151, 154, 158, 161, 168, 201, 202, 203, 222</td>
</tr>
<tr>
<td>19, 170, 157</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>61</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>181, 221</td>
</tr>
<tr>
<td>73</td>
</tr>
<tr>
<td>27</td>
</tr>
<tr>
<td>6, 27</td>
</tr>
<tr>
<td>6, 27, 28</td>
</tr>
<tr>
<td>103</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>52, 81</td>
</tr>
<tr>
<td>75, 154</td>
</tr>
<tr>
<td>194</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>69</td>
</tr>
<tr>
<td>69</td>
</tr>
<tr>
<td>52</td>
</tr>
<tr>
<td>52</td>
</tr>
<tr>
<td>54</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>51</td>
</tr>
<tr>
<td>69</td>
</tr>
<tr>
<td>69</td>
</tr>
<tr>
<td>79</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>35</td>
</tr>
<tr>
<td>139</td>
</tr>
<tr>
<td>162</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>181</td>
</tr>
<tr>
<td>130</td>
</tr>
<tr>
<td>208</td>
</tr>
<tr>
<td>91, 129, 180</td>
</tr>
<tr>
<td>73</td>
</tr>
<tr>
<td>39</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>167, 177, 179</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>222</td>
</tr>
<tr>
<td>6, 12, 46, 181, 222</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>74</td>
</tr>
<tr>
<td>69</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>99</td>
</tr>
<tr>
<td>154</td>
</tr>
<tr>
<td>103</td>
</tr>
<tr>
<td>174</td>
</tr>
<tr>
<td>53</td>
</tr>
<tr>
<td>179</td>
</tr>
<tr>
<td>133, 134, 154</td>
</tr>
<tr>
<td>179</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>209</td>
</tr>
<tr>
<td>6, 299</td>
</tr>
<tr>
<td>208</td>
</tr>
<tr>
<td>207, 215</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>212</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>146</td>
</tr>
<tr>
<td>162</td>
</tr>
</tbody>
</table>
INSECT INDEX.

Dacus australis ................................................. 58
   cucurbitae .............................................. 38, 39, 217
curepennis ............................................... 34
diversus .............................................. 60, 117, 132, 147, 167
ferrugineus ...................................... 60, 93, 100, 117, 147
frenchii ............................................... 156
alexis .................................................. 156
arnatisimus ........................................... 58
passiflora ........................................... 60, 117, 126, 147
persica ................................................. 117, 147, 167
psidii ................................................ 118, 126, 132
rarotongia ........................................... 145
tongensis .............................................. 145
(Tephrithes) xanthodes .................. 118, 126, 132, 142, 171

Dasychira harsfeldi .......................................... 194
   mendoza .............................................. 64, 212
   misana ............................................. 64, 212
   padibunda ........................................... 12, 40,
   47, 107, 132, 134, 137, 141, 148, 154, 162
   seticrana .......................................... 66
   tassitex ............................................ 64, 212

Dasyseura abietiperda ........................................ 81
   brassica .............................................. 49, 188
   laricis .............................................. 84
   picea ............................................... 81
   pyri .................................................. 168

Death's-head moth (see Acherontia atropos) ....

Delphacodes vastatrix ........................................ 206

Delphax fumosa ........................................ 206
   graminicola ....................................... 206
   propinqua ......................................... 206

Deltocepiialus dorsalis ...................................... 190,
   206

Dendroctonus micans ......................................... 65

Dendrolimus pini ........................................ 71
   sibiricus .......................................... 83

Depressaria depressella ..................................... 164
   nerosa .............................................. 51, 164

Dermestes frischii ......................................... 5
   vulpinus ............................................ 5

Desia naevis ............................................. 185, 217

Diabrotica graminicola ..................................... 85, 155

Diacrisia obliqua ......................................... 91

Diatroctodes erythrurus ................................... 64, 94
   scalaris ............................................. 64, 94

Diatracea apulor .......................................... 193

Diamorbus fici ........................................... 103

Diamond-back moth (see Luntella maculipennis)  

Disatrea abbreviatus ........................................ 30,
   64, 85, 126, 132, 146, 192, 200
   speenleri (see Disatrea abbreviatus) ........

Dispar capillatus ........................................... 134

Distepsia噇 ............................................. 194

Distylium bipunctatum ..................................... 154

Dysjesipites (see Aspidiotus [Dispsidiotus]) ....

Dyspsis atlantica ........................................... 139

Eucolax ................................................. 102

cattleya ............................................... 158

camellia .............................................. 132, 166, 220

cavan ............................................... 156

ceratoeytus .......................................... 194

Dyspholus pusillius ....................................... 79, 84

Dryarctia planipennis ................................... 12

Dryococcolis naevius .................................... 143

Dryophlebus planus ...................................... 154

Dryomolius catenatus .................................... 64, 154

Dryobates melanocephala ................................... 190

Dryophthorus pusillus ................................... 79, 84

Dryomolius altilus ...................................... 212

Durura stem borer (see Sesamia etritae) ........

Dyselus spp .............................................. 86
   andreae .............................................. 86
   annuliger .......................................... 86
   cardinatis ......................................... 86
   cinngulatus ....................................... 86, 87
   delanegi ............................................ 86
   fasciata ............................................ 86
   fernald ............................................. 86
   howardi ............................................. 86

Dyspsis pyri ............................................. 25, 169
   sanitatis ........................................... 169
   squamosus ......................................... 166, 169
   viaci ............................................... 25, 75, 94, 139
   zaniexe .............................................. 5, 162

Diasporus politus .......................................... 206

Diastrophus spp .......................................... 203
   canella ............................................. 203
   lineolata .......................................... 203
   saccharalis ......................................... 6, 203
   striatellus ......................................... 205, 208

Dichocrocis punctiferata .................................. 24, 34, 51,
   60, 85, 94, 126, 132, 142, 167

Diceranoptera castanea .................................... 190, 206

Dильоба керапоцеллата .................................... 21, 179

Dindynus versicolor ........................................ 17, 196

Dinodera brevis .......................................... 33
   distinctus .......................................... 33, 143
   minutus ............................................. 31, 207
   philips ............................................... 91

Diorctycia splendidula .................................... 76

Distroctus politus .......................................... 190

Diparopsis castanea ........................................ 91

Diphyocha phalera ........................................ 10

Dolopsidae .............................................. 172

Dipsocera rotundicolla ................................... 59

Diplosis eucaulapti ....................................... 100

Pare .................................................... 100

Dipria pallidus .......................................... 70
   pini ................................................ 70
   rufus ................................................. 70
   simile .............................................. 6, 70

Dischopora celinda ......................................... 205

Distichocera nucleai ..................................... 97

Dolopus marginatus ........................................ 68, 153

Dorytonus affinis ........................................ 222

Dorytonus annulatus ...................................... 222
   doratius .......................................... 222
   maculatus ......................................... 222
   maculatus ......................................... 222

Dorisus manja .......................................... 222

Dotaxis pestis ........................................... 21

Dreata petola ........................................... 208

Drepana culinaria ......................................... 40

Dreyfusia nasalets ........................................ 67

Picea ...........................................................

Drosica muscatel .......................................... 102

Drugstore beetle (see Sitodrepa panicula) ....

Dryococcolis naevius .................................... 12

Dryoglossus fucus ........................................ 69
   hevettii ............................................. 154

Dipria pallidus .......................................... 70

Dystelus melanocephala ................................... 190

Dyspholus pusillus ....................................... 79, 84

Duodinius catenatus ...................................... 212

Durura stem borer (see Sesamia etritae) ........

Dyselus spp .............................................. 86
   andreae .............................................. 86
   annuliger .......................................... 86
   cardinatis ......................................... 86
   cinngulatus ....................................... 86, 87
   delanegi ............................................ 86
   fasciata ............................................ 86
   fernald ............................................. 86
   howardi ............................................. 86
### INSECT INDEX.

<table>
<thead>
<tr>
<th>Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysdercus insularis</td>
<td>86</td>
</tr>
<tr>
<td>nigrofasciatus</td>
<td>86</td>
</tr>
<tr>
<td>pacificus</td>
<td>86</td>
</tr>
<tr>
<td>rubicolor</td>
<td>86</td>
</tr>
<tr>
<td>sanguinarius</td>
<td>86</td>
</tr>
<tr>
<td>side</td>
<td>86</td>
</tr>
<tr>
<td>supranubifer</td>
<td>5, 86</td>
</tr>
<tr>
<td>suturillus</td>
<td>5, 86</td>
</tr>
<tr>
<td>Earias chlorana</td>
<td>91, 223</td>
</tr>
<tr>
<td>chromataria</td>
<td>91</td>
</tr>
<tr>
<td>fabia</td>
<td>91</td>
</tr>
<tr>
<td>gossypii</td>
<td>91</td>
</tr>
<tr>
<td>insulana</td>
<td>87</td>
</tr>
<tr>
<td>plaga</td>
<td>91</td>
</tr>
<tr>
<td>Early moth</td>
<td>(see Hibernia rupicapraria).</td>
</tr>
<tr>
<td>East African cotton weevil</td>
<td>(see Apion canthostylum).</td>
</tr>
<tr>
<td>Earias insulana</td>
<td>87</td>
</tr>
<tr>
<td>Eggplant fruit borer</td>
<td>(see Leucinodes ortho- nalis).</td>
</tr>
<tr>
<td>Egyptian cotton holl worm</td>
<td>(see Earias insulana).</td>
</tr>
<tr>
<td>Eight-toothed large spruce bark beetle</td>
<td>(see Ips typographus).</td>
</tr>
<tr>
<td>Epaphodes tigrinus</td>
<td>10</td>
</tr>
<tr>
<td>Elimsea chloris</td>
<td>205</td>
</tr>
<tr>
<td>Elm bark beetle</td>
<td>(see Scolytus multistriatus).</td>
</tr>
<tr>
<td>leaf beetle</td>
<td>(see Galeruca luteola).</td>
</tr>
<tr>
<td>sawfly</td>
<td>(see Fenusa dohrnii).</td>
</tr>
<tr>
<td>Enarmanta pinicloana</td>
<td>67, 70</td>
</tr>
<tr>
<td>Euphimia</td>
<td>77, 78</td>
</tr>
<tr>
<td>Entochira lateralis</td>
<td>198, 216</td>
</tr>
<tr>
<td>Eutecta pumilio</td>
<td>47</td>
</tr>
<tr>
<td>Epacromia tumulus</td>
<td>205</td>
</tr>
<tr>
<td>Epepeotes luscus</td>
<td>50, 146</td>
</tr>
<tr>
<td>Ephedria cautella</td>
<td>6, 163</td>
</tr>
<tr>
<td>elticide</td>
<td>76</td>
</tr>
<tr>
<td>kuwshielit</td>
<td>6</td>
</tr>
<tr>
<td>Epilachna nigricana</td>
<td>(see Eucosoma).</td>
</tr>
<tr>
<td>telcilla</td>
<td>(see Laspeyresia).</td>
</tr>
<tr>
<td>Epipacta rufidorsum</td>
<td>43, 154</td>
</tr>
<tr>
<td>sibirica</td>
<td>154</td>
</tr>
<tr>
<td>Epipactus acacicul</td>
<td>9</td>
</tr>
<tr>
<td>Epidiaspis prircola</td>
<td>5, 23, 24, 121, 166, 169</td>
</tr>
<tr>
<td>Epilachna spp</td>
<td>92, 153</td>
</tr>
<tr>
<td>argus</td>
<td>92</td>
</tr>
<tr>
<td>chrysocelina</td>
<td>92</td>
</tr>
<tr>
<td>dodocastigma</td>
<td>92, 153</td>
</tr>
<tr>
<td>guittaco-pastulata</td>
<td>153</td>
</tr>
<tr>
<td>35-maculata</td>
<td>153</td>
</tr>
<tr>
<td>38-punctata</td>
<td>92, 153</td>
</tr>
<tr>
<td>phyte</td>
<td>153</td>
</tr>
<tr>
<td>pusillainia</td>
<td>153</td>
</tr>
<tr>
<td>territo</td>
<td>153</td>
</tr>
<tr>
<td>Epipamus abius</td>
<td>207</td>
</tr>
<tr>
<td>Eresnestis flavistria</td>
<td>34, 163, 171, 204, 208</td>
</tr>
<tr>
<td>mutrielle</td>
<td>206</td>
</tr>
<tr>
<td>pilosata</td>
<td>208</td>
</tr>
<tr>
<td>Erucamoides timaciua</td>
<td>6</td>
</tr>
<tr>
<td>Erioecocis acris</td>
<td>39, 147, 153</td>
</tr>
<tr>
<td>angustatus</td>
<td>25</td>
</tr>
<tr>
<td>araucarie</td>
<td>25</td>
</tr>
<tr>
<td>buzi</td>
<td>48</td>
</tr>
<tr>
<td>confusus</td>
<td>99</td>
</tr>
<tr>
<td>Erioecocis cortaceus</td>
<td>99, 131</td>
</tr>
<tr>
<td>crispus</td>
<td>102</td>
</tr>
<tr>
<td>crypti</td>
<td>99</td>
</tr>
<tr>
<td>eucalypti</td>
<td>99</td>
</tr>
<tr>
<td>fpicoricus</td>
<td>39</td>
</tr>
<tr>
<td>graminis</td>
<td>33</td>
</tr>
<tr>
<td>gregarius</td>
<td>99</td>
</tr>
<tr>
<td>irregularis</td>
<td>99</td>
</tr>
<tr>
<td>logostramale</td>
<td>102</td>
</tr>
<tr>
<td>onukni</td>
<td>33</td>
</tr>
<tr>
<td>pallidus</td>
<td>39</td>
</tr>
<tr>
<td>pica</td>
<td>99</td>
</tr>
<tr>
<td>raithybi</td>
<td>39</td>
</tr>
<tr>
<td>serratiobis</td>
<td>99</td>
</tr>
<tr>
<td>simplex</td>
<td>99</td>
</tr>
<tr>
<td>spiniger</td>
<td>99</td>
</tr>
<tr>
<td>tepperi</td>
<td>99</td>
</tr>
<tr>
<td>tesselatus</td>
<td>99</td>
</tr>
<tr>
<td>Eriogaster lanestris</td>
<td>46, 141, 154, 181, 233</td>
</tr>
<tr>
<td>Eriophyes spp</td>
<td>172</td>
</tr>
<tr>
<td>azelina</td>
<td>153</td>
</tr>
<tr>
<td>faxina</td>
<td>26</td>
</tr>
<tr>
<td>goniothorax</td>
<td>132</td>
</tr>
<tr>
<td>gossypii</td>
<td>36</td>
</tr>
<tr>
<td>hesia</td>
<td>111</td>
</tr>
<tr>
<td>larici</td>
<td>32</td>
</tr>
<tr>
<td>macrochelis</td>
<td>147</td>
</tr>
<tr>
<td>olivetorans</td>
<td>5, 55</td>
</tr>
<tr>
<td>padi</td>
<td>5, 172</td>
</tr>
<tr>
<td>philaeopterus</td>
<td>5, 172</td>
</tr>
<tr>
<td>pini</td>
<td>70</td>
</tr>
<tr>
<td>psiaspis</td>
<td>223</td>
</tr>
<tr>
<td>pgr</td>
<td>5</td>
</tr>
<tr>
<td>quadrirsetus</td>
<td>139</td>
</tr>
<tr>
<td>ribis</td>
<td>118, 119</td>
</tr>
<tr>
<td>rudis</td>
<td>45</td>
</tr>
<tr>
<td>similis</td>
<td>172</td>
</tr>
<tr>
<td>tetanothrix</td>
<td>222</td>
</tr>
<tr>
<td>tiliae</td>
<td>141</td>
</tr>
<tr>
<td>tiliarius</td>
<td>141</td>
</tr>
<tr>
<td>vernafomina</td>
<td>133</td>
</tr>
<tr>
<td>vitis</td>
<td>5, 127</td>
</tr>
<tr>
<td>Erioecocis laeuginoza</td>
<td>95</td>
</tr>
<tr>
<td>ulini</td>
<td>95</td>
</tr>
<tr>
<td>Erubius abietinus</td>
<td>73</td>
</tr>
<tr>
<td>abietis</td>
<td>79</td>
</tr>
<tr>
<td>angusticollis</td>
<td>79</td>
</tr>
<tr>
<td>longicornis</td>
<td>79</td>
</tr>
<tr>
<td>nigrinus</td>
<td>73</td>
</tr>
<tr>
<td>pini</td>
<td>73</td>
</tr>
<tr>
<td>Eruborus caucasicus</td>
<td>141</td>
</tr>
<tr>
<td>fagi</td>
<td>40</td>
</tr>
<tr>
<td>tilis</td>
<td>141</td>
</tr>
<tr>
<td>Estigmene chinensis</td>
<td>33</td>
</tr>
<tr>
<td>Etiaella zitzenkella</td>
<td>165</td>
</tr>
<tr>
<td>Eubactrus sp</td>
<td>78</td>
</tr>
<tr>
<td>Eucalyptus brunfelsiae</td>
<td>35</td>
</tr>
<tr>
<td>Eucanthes semiplaudec</td>
<td>206</td>
</tr>
<tr>
<td>Euchelis jacobsii</td>
<td>185</td>
</tr>
<tr>
<td>Euchirus macloagi</td>
<td>153</td>
</tr>
<tr>
<td>Euchloris submissaria</td>
<td>10</td>
</tr>
<tr>
<td>Eucoecia nigricana</td>
<td>77</td>
</tr>
<tr>
<td>parapharmina</td>
<td>32</td>
</tr>
<tr>
<td>schistacea</td>
<td>206</td>
</tr>
<tr>
<td>Eudamus protex</td>
<td>38</td>
</tr>
<tr>
<td>Exnerus stratigus</td>
<td>139, 157</td>
</tr>
<tr>
<td>Common Name</td>
<td>Page</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>Euemotopia krayeri</td>
<td>206</td>
</tr>
<tr>
<td>Euophyllia oleacea</td>
<td>156</td>
</tr>
<tr>
<td>Euplectis nigerrima</td>
<td>185</td>
</tr>
<tr>
<td>Evaprotus chrysorhoe</td>
<td>6, 40, 107, 132, 137, 148, 154, 181, 192, 223</td>
</tr>
<tr>
<td>diatra</td>
<td>212</td>
</tr>
<tr>
<td>fascata</td>
<td>208</td>
</tr>
<tr>
<td>fraxinosa</td>
<td>55</td>
</tr>
<tr>
<td>laisica</td>
<td>212</td>
</tr>
<tr>
<td>minor</td>
<td>208</td>
</tr>
<tr>
<td>Eupteryx solani</td>
<td>184</td>
</tr>
<tr>
<td>European grain moth (see Tinea granella)</td>
<td></td>
</tr>
<tr>
<td>thrips (see Harpobthrips trici)</td>
<td></td>
</tr>
<tr>
<td>hop flea-beetle (see Psyllodes attenuata)</td>
<td></td>
</tr>
<tr>
<td>pine shoot moth (see Evetria buio)</td>
<td></td>
</tr>
<tr>
<td>Euscepes batatas</td>
<td>209</td>
</tr>
<tr>
<td>Eusura ater</td>
<td>223</td>
</tr>
<tr>
<td>Eurala radians</td>
<td>184</td>
</tr>
<tr>
<td>segasti</td>
<td>91</td>
</tr>
<tr>
<td>spiniiera</td>
<td>216</td>
</tr>
<tr>
<td>Eusophora cedrella</td>
<td>52, 70</td>
</tr>
<tr>
<td>Ecaspidius (see Aspidius (Ecaspidius))</td>
<td>52, 70</td>
</tr>
<tr>
<td>Evergestis eximialis</td>
<td>49, 87, 188</td>
</tr>
<tr>
<td>Evetria spp</td>
<td>72</td>
</tr>
<tr>
<td>buoliana</td>
<td>6, 70, 72</td>
</tr>
<tr>
<td>consotkiana</td>
<td>72</td>
</tr>
<tr>
<td>duplana</td>
<td>6, 72</td>
</tr>
<tr>
<td>frustrana</td>
<td>72</td>
</tr>
<tr>
<td>pinororana</td>
<td>6, 72</td>
</tr>
<tr>
<td>resimella</td>
<td>72</td>
</tr>
<tr>
<td>rigidana</td>
<td>72</td>
</tr>
<tr>
<td>turionana</td>
<td>6, 72</td>
</tr>
<tr>
<td>Feather-horned yellow-box borer (see Distichocera macleayi)</td>
<td>156</td>
</tr>
<tr>
<td>Felvia sp</td>
<td>6</td>
</tr>
<tr>
<td>Fenusa dohrui</td>
<td>6</td>
</tr>
<tr>
<td>Fig branch borer (see Hylocnus porcatus)</td>
<td></td>
</tr>
<tr>
<td>moth (see Ephesia castella)</td>
<td></td>
</tr>
<tr>
<td>stem-boring beetle (see Sinoxylon sadaicum)</td>
<td></td>
</tr>
<tr>
<td>tree borer (see Bactocera boisduvali)</td>
<td></td>
</tr>
<tr>
<td>Figure-of-s-moth (see Diloba ericophaga)</td>
<td></td>
</tr>
<tr>
<td>Fiji fly (see Dacta passii)</td>
<td></td>
</tr>
<tr>
<td>Filippia ales</td>
<td>156</td>
</tr>
<tr>
<td>Florinia acacia</td>
<td>9</td>
</tr>
<tr>
<td>hambaru</td>
<td>32</td>
</tr>
<tr>
<td>dissepiformis</td>
<td>32</td>
</tr>
<tr>
<td>grossularis</td>
<td>121</td>
</tr>
<tr>
<td>signata</td>
<td>32</td>
</tr>
<tr>
<td>stricta</td>
<td>158</td>
</tr>
<tr>
<td>trinex</td>
<td>32</td>
</tr>
<tr>
<td>theca</td>
<td>156, 212</td>
</tr>
<tr>
<td>Fir bark tortricid (see Laspeyresia duplicana)</td>
<td></td>
</tr>
<tr>
<td>bud worm (see Eucomma nivicana)</td>
<td></td>
</tr>
<tr>
<td>Flatheaded leaf-miner beetle (see Aphanistas tichus consanguineus)</td>
<td></td>
</tr>
<tr>
<td>wood borer (see Agrius viridis)</td>
<td></td>
</tr>
<tr>
<td>Flax capsule worm (see Phalonia epilina)</td>
<td></td>
</tr>
<tr>
<td>Flea beetle (see Phyllotreta atra)</td>
<td></td>
</tr>
<tr>
<td>Flour beetle</td>
<td>122</td>
</tr>
<tr>
<td>Fluted scale (see Icerya purchasi)</td>
<td></td>
</tr>
<tr>
<td>Forzecolidae fraxini</td>
<td>26</td>
</tr>
<tr>
<td>Galeruscella longula</td>
<td>6</td>
</tr>
<tr>
<td>tenuella</td>
<td>197</td>
</tr>
<tr>
<td>Galloboicus crassicornis</td>
<td>215</td>
</tr>
<tr>
<td>Gasterocercodes gossypi</td>
<td>91</td>
</tr>
<tr>
<td>Gastropacha quercifolia</td>
<td>24, 111, 132, 170, 179, 223</td>
</tr>
<tr>
<td>Galastrophora hwarica</td>
<td>99</td>
</tr>
<tr>
<td>Gathula apsara</td>
<td>154</td>
</tr>
<tr>
<td>Geastorhinus eos</td>
<td>205</td>
</tr>
<tr>
<td>Gelechis atriplicella</td>
<td>41</td>
</tr>
<tr>
<td>dodreccia</td>
<td>70</td>
</tr>
<tr>
<td>gossypiella (see Pectinophora)</td>
<td>41</td>
</tr>
<tr>
<td>instabilleta</td>
<td>41</td>
</tr>
<tr>
<td>ocellatella</td>
<td>41, 42</td>
</tr>
<tr>
<td>Gelenathia hirta</td>
<td>212</td>
</tr>
<tr>
<td>Geococcus radicis</td>
<td>146</td>
</tr>
<tr>
<td>Geoffica lucifuga</td>
<td>207</td>
</tr>
<tr>
<td>Geonoma quadrinodosa</td>
<td>64</td>
</tr>
<tr>
<td>Giant sugar cane borer (see Cynnia licue)</td>
<td></td>
</tr>
<tr>
<td>G.iffard fruit fly (see Ceratitis giffardii)</td>
<td></td>
</tr>
<tr>
<td>white fly (see Bemisia giffardii)</td>
<td></td>
</tr>
<tr>
<td>Gipsy moth (see Porthetria dispar)</td>
<td></td>
</tr>
<tr>
<td>Gliena nongenatata</td>
<td>50</td>
</tr>
<tr>
<td>Gliophora betula</td>
<td>45</td>
</tr>
<tr>
<td>Gnathodes pallidulus</td>
<td>206</td>
</tr>
<tr>
<td>viridis</td>
<td>206</td>
</tr>
<tr>
<td>Guorinosche chlorina</td>
<td>215</td>
</tr>
<tr>
<td>Gnat moth (see Cosmus conus)</td>
<td></td>
</tr>
<tr>
<td>Gnoscothephilum intermedium</td>
<td>216</td>
</tr>
<tr>
<td>Gnoscothephilum (Opatrum) acutangulum</td>
<td>207, 216</td>
</tr>
<tr>
<td>pusillium</td>
<td>216</td>
</tr>
<tr>
<td>subulosum</td>
<td>43, 73</td>
</tr>
<tr>
<td>Gooseberry moth (see Zophodana consolatella)</td>
<td></td>
</tr>
<tr>
<td>Gortyna flava</td>
<td>185</td>
</tr>
<tr>
<td>ochracea</td>
<td>185</td>
</tr>
<tr>
<td>Gossypia rattielli</td>
<td>96</td>
</tr>
<tr>
<td>sparsa</td>
<td></td>
</tr>
<tr>
<td>Graecilla springella</td>
<td>37</td>
</tr>
<tr>
<td>Grain fly (see Camarota flavicollis)</td>
<td></td>
</tr>
<tr>
<td>Grape anomala (see Anomala vitis)</td>
<td></td>
</tr>
<tr>
<td>blister mite (see Eriophyes vitis)</td>
<td></td>
</tr>
<tr>
<td>blisters (see Vespera spp.)</td>
<td></td>
</tr>
<tr>
<td>gun worm (see Sciuropsen regale)</td>
<td></td>
</tr>
<tr>
<td>pyralid (see Polyphaga botra)</td>
<td></td>
</tr>
<tr>
<td>root weevils (see Brachydrus spp.)</td>
<td></td>
</tr>
<tr>
<td>worm (see Bromius spp.)</td>
<td></td>
</tr>
<tr>
<td>vine flatheaded borer (see Sinoxylon spp.)</td>
<td></td>
</tr>
<tr>
<td>worm (see Cachrysinae)</td>
<td></td>
</tr>
<tr>
<td>Grapholitha (see Laspeyresia spp.)</td>
<td></td>
</tr>
<tr>
<td>Grass army worm (see Spodoptera mauritia)</td>
<td></td>
</tr>
<tr>
<td>Gray borer of the sugar cane (see Laspeyresia schistacea)</td>
<td></td>
</tr>
<tr>
<td>fruit tree bud moth (see Oulethres cyanoballata)</td>
<td></td>
</tr>
<tr>
<td>karni moth (see Enarmonia pinicola)</td>
<td></td>
</tr>
<tr>
<td>plum ovat moth (see Xylena orni-thopus)</td>
<td></td>
</tr>
<tr>
<td>Greasy eutr (see Agrotis spilvion)</td>
<td></td>
</tr>
<tr>
<td>Great oak borer (see Cerambyx cerdo)</td>
<td></td>
</tr>
</tbody>
</table>
.insect index.

Page.

Greedy scale (see Aspidiotus clematitix)........... 325
Green hanging moth of the apple (see Choragin
 americanum)................. 177
leaf weevil (see Phyllobius maculifer-
cornis).............. 33
pet moth (see Chloroclystis reticulata-
ata).............. 190
oak tortrix (see Tortrix viridana)........... 162
Gryllotalpa africana nervous........... 98, 190, 205, 215
Gryllotalpa pacifica......... 43, 45, 215
chulga (see Gryllotalpa gryl-
talpa).............. 101
Gryllus melas
miritatus............... 205
Guerriniella serrata........... 73, 94, 96, 130, 150
Gum tree bug (see Meteor profana)........ 103
Gunda atlascini............. 103
Gypsy moth (see Porthetria dispar)........ 125
Hakone scale............ 125
Halimococcus lampos........ 162
Halletia ampiolelaphraga........ 128, 222
quercetorum, 12, 39, 46, 134, 151, 192, 222
Haplothrips aculeatus........ 125
triticis.................. 125
Harlequin fruit bug (see Dindymus versicolor)...... 81
Harpalus venes
ruscorinus................ 196
Hawaiian beet weevil (see Hymenina fasic-
cialis).............. 267
leaf bug (see Hyalomplus ferruci-
dus).............. 267
sugar-cane borer (see Rhodocenmis obcaerus)...... 81
sugar-cane leafrroller (see Omioades acpeta)..... 81
Hawthorne scale (see Lecanium bituberculat-
atum).............. 267
Hazelnut blister mites (see Eriophyes avellana-
x; Eriophyes crassiformis)........ 267
Helodotis acrustus........... 267
Heliophilus bolloni........... 101
auri.... 30
Heliothrips rubrocinclus.... 5, 50, 63, 109, 132, 140, 146, 192, 218
strigopetera........... 267
Heluta undulis........... 6, 186
Helipontus antolin........... 50
the late........... 50
Hemiberlesia (see Aspido
tis [Hemiberlesia])........ 11
Hemichromaspis sp
fiel.................. 102
minima........... 102
scrobicularis........... 32
Hemipterna atrilatex........ 150
Hepialus humuli........... 85, 135, 183, 188
lapalminus........... 145
Hera constrictu........... 210
Hesperia conjuncta........... 208
Hessian fly (see Phyllophaga destructor)........ 208
Heterochrodes uncus........... 131
Heterobostrichus squallis........ 193, 194
pilatensis........... 193
unicornis........... 33
Heteropria varia............. 193
Heterokhirus hookeri........... 10
Heteropria cingula........... 212
Hibernia aurantia........... 10, 46, 132, 141, 154, 181
defoliaria........... 24, 40, 46, 95, 103, 137, 141, 149, 154, 181
marginaaria........ 40, 46, 132, 137, 141, 154, 181
rupicapraria........... 111, 179
Hercoglyphus bauiana........... 190
Himalatia asperum........... 193
Hippa venes
ccinclus........... 190
Heleniaria phcesteric (see Euchirca lemniscalis)..... 207
Heliodryas leucophaeolaima........... 207
vidu........... 207
Holotrichus prochiereni (see Proctophillus hu-
 meliz).............. 125
Hop aphids (see Phorodon humuli)........ 325
leaf miner (see Agraomyza fonsolisi)........ 6
midge (see Cecidomyia humuli)........ 6
root borer (see Hepialus humuli)........ 6
Hylodaches fulvicornis........... 24, 177, 178
rufilicornis........... 189
testudinaria........... 22, 23
Hoplocrambus spinicornis........... 193
Hormomyia annulipes........... 40
flagi........... 40
Hornet moth (see Trochilium spp)........ 325
Horse-chestnut borer (see Zenziera pyrina)........ 325
Hylocoephus pellucidus........... 37
Hydrellia griseola........... 125
Hydrocles minacea........... 185
Hylobates augustomus........... 74
ater........... 74
alternatus........... 69
cunicularius........... 81
decumanus........... 69
himalayensis........... 69
laptopsobina........... 74
opanus........... 74
Hylocrata cornutoides........ 39, 46, 79, 148, 153
Hylocyema antiqua........... 157
concretata........... 124
Hylognathus ceratolus........... 27, 154
frazili........... 27, 157
olth........... 157
coleperda........... 27
pocatus........... 101
vestitius........... 157
Hylobius abietis........... 12, 40, 46, 68
fatuus........... 68
pisus........... 68
Hylotrax leucochonus........... 68
Hylocyema grandinatis........... 81
palliatus........... 69
Hylogozus lipigoperda........... 74
Hymenina fascialis........... 6, 42, 43
Hypena rostalca........... 137
Hypenaspis........ 137
crulito........... 184
fasciculata........... 51
mite........ 6, 14, 61
mites........... 61
murina........... 13, 61
nitidirrostris........... 6, 61, 158
onimidax........... 61, 158
pastinaceum tigrina........... 51
Insect Index.

Hypera postica .................................................. 6, 14, 15
punctata .................................................. 6, 14, 51, 61
roegenhoferi ............................................... 51
rumicis .................................................. 189
variabilis .................................................. 38, 47, 61, 184, 185

Hypoborus fuscus ............................................. 103
Hyposechus indicus .......................................... 193
Hypomeces curvus ........................................... 63
unicolor .................................................. 191, 207

Hyponomema evonymela ................................... 48
nullatellus .................................................. 21, 180
padellus .................................................. 21, 180
pdd ..................................................... 48

Hysipyla robusta ........................................... 142, 218
Icerya aegyptiaca ........................................... 102
albolutea .................................................. 94
maxima ................................................... 102
minor .................................................... 145
monticellularis ............................................. 90, 35, 59, 131, 162, 192
• palmeri .................................................. 102, 130
purchasi .................................................. 5, 9
sechellarum ................................................. 59, 102, 131, 146, 162, 192, 206

Imported cabbage butterfly (see Pontia raps).
maggot (see Chorophila (Pegomya) brassicae).
clover weevil (see Microtorus pietrostris).
onion maggot (see Pegomya cepeterum).

Ina ameperophaga ........................................... 131
Incucaria capitella .......................................... 121

Indian meal moth (see Plodia interpunctella).
tea geometrid (see Biston suppres- rius).

Insecta leprosa ............................................... 163
Inglisia conchiformis ...................................... 131
fagi ....................................................... 39

Ips confusus ............................................... 74
amitinus .................................................. 69
blondardi .................................................. 74
combra ................................................... 69
duplicatus .................................................. 69
longifolia .................................................. 74
mannsfeldi .................................................. 69
ribbetropi .................................................. 69
scadenatus .................................................. 69
stebbingi .................................................. 52
typographus ................................................. 66, 69

Island I fruit fly (see Rioa muse).
Isosoma azaleae ............................................. 126
Itycoria campestris ........................................ 77
stictata ................................................... 77

Janus compressus ........................................... 169
cynosbitti ................................................. 154
fumipennis ................................................. 47
luticipes .................................................. 192
Japanese grain moth (see Melissiofptdes
gularis).
rose beetle (see Adoretus umbrosus).

Jasus scutatus ................................................. 125
Java cinchona geometrid (see Bourrnia
crepuscularia).
sugarcane grub beetle (see Aponia
Spp.).

June beetle (see Melolontha spp.).

Juniper blister mite (see Eriophyes quadri- setus).

Kakivoria fuscovasciata .................................. 170
Kermes acacis .............................................. 9
baccaformis ................................................. 153
ballota ................................................... 153
cordiformis ................................................. 153
gibbosus .................................................. 153
ilicis ..................................................... 153
pallidus .................................................. 153
roboris ................................................... 153
vermilio .................................................. 153

Kirbya pygmaea ............................................. 206
Kuwania parea ............................................. 178

Lachnosterna (see Phyllophaga).

Lachnis agilis ................................................. 72
fasciatus .................................................. 81
grossus .................................................... 78, 81
laricis ..................................................... 84
nudus ....................................................... 72
picca ...................................................... 78, 81
picca ...................................................... 78
pini ....................................................... 72
pinicola .................................................... 81
tenatus .................................................... 72
tomentosus ................................................... 172
timucalis .................................................... 222

Lackey moth (see Malacosoma neustria).

Laccon sp. near davidii .................................. 81
murinus .................................................... 43, 153, 184
shirkii ...................................................... 207

Lelia costalis ................................................. 205
subrufa ..................................................... 208

Lxmophaeus testaceus ..................................... 193

Lemotmetus rhizophagoides ................................ 190

Lepischnia strachani ..................................... 94

Lamia textor ................................................. 181, 222

Lampito assimensis ...................................... 103
decipiens ................................................... 96
rutilans .................................................... 12, 96, 141
undatus .................................................... 141
Laphygma exigua (Caradrina) ......................... 6, 14, 210
reclusa ...................................................... 210, 218

Lappet moth (see Gastropacha quercifolia).

Larch blister mite (see Eriophyes larici).

bud-gall midge (see Dasyneura larici).
gall mite (see Laspeyresia zebra).
needle mite (see Colophora laricella).
sawfly (see Nematrus crichsoni).

shoot moth (see Argyresthia lavigata).
spiner (see Dendrolimus sibiicus).
tussuk moth (see Dasychira selenticola).

Larentia dilutata ............................................ 12, 40, 46, 96, 154, 223
nebulata ..................................................... 46

Large Australian fruit fly (see Dacus senanue).

bust beetle (see Dendroctonus micans).
pith borer (see Tomius (Myelophillus
piniperda).

pear psylla (see Psylla pyriana).

Lasiosiopha quercus ...................................... 75, 154
trifoli ...................................................... 60

Lasioderma serricorne ..................................... 6

Lasioptera cerealis ........................................ 124
miscella .................................................... 100
Laspeyresia spp. ........................................ 165
amplana ........................................ 134, 220
conditana ........................................ 79
dorsana ........................................ 165
duplexana ........................................ 67, 140
funebrana ........................................ 176
glycinivorella ........................................ 196
grossana ........................................ 38, 54, 134, 154, 196, 220
metribana ........................................ 165, 196
nigricana ........................................ 6, 165
paclolana ........................................ 79, 80
pomonella ........................................ 6
protenana ........................................ 79
pruninetana ........................................ 179
schistacena ........................................ 204
splendana ........................................ 33, 54, 154, 220
strobilata ........................................ 80
tedella ........................................ 80, 81
weberiana ........................................ 176
zebedea ........................................ 83

Lathemic oryzza ....................................... 122
Leaf hispa (see Brontispa forruggi). ..............
Leather beetle (see Dermestes spp). ..............
Lecaniophis acacae ....................................
africanus ........................................ 9, 102
conceus ........................................ 98
dilatata ........................................ 9
frenchi ........................................ 98
neurnanni ........................................ 98
sordoa ........................................ 192
Leconium aceris ......................................
arizon ........................................ 25
bituberulentum .................................... 5, 23, 132, 169
capreri ........................................ 11, 23, 169
cater ........................................ 110
caudatus ........................................ 63
ceras ........................................ 178
cerasorum ........................................ 178
ciliatum ........................................ 45, 48, 153, 181, 222
corni ........................................ 11
coryli ........................................ 11, 24, 45, 95, 96, 121, 132, 134, 137,
138, 141, 147, 153, 169, 178, 181, 186, 220, 222
glandi ........................................ 23, 169
guerinii ........................................ 206
krugerii ........................................ 206
kunoenti ........................................ 24, 166, 169
peronatum ........................................ 191
perez ........................................ 25, 190, 166, 186
prunivest ........................................ 24, 179
pseudocerat ........................................ 162
pulchrurn ........................................ 45, 33, 134, 137, 133, 191
pyrr ........................................ 23
rehu ........................................ 121
rubu ........................................ 121
rugosum ........................................ 23, 166, 169, 179, 186
sericenum ........................................ 79
sitia ........................................ 169
tenax ........................................ 23
viviparum ........................................ 23, 24, 130, 166, 169
Laspeyresia granicollis ..............................
Leuca cynellata ....................................
flavipes ........................................ 191
melenopus ........................................ 122
Lemon caterpillar (see Papilio demoleus) ....
silver mite (see Triophyus oleivorus). ...........
Northern mango weevil (Sternochus gravis), 73
peach moth (Conogethes punctiferalis), 47, 121, 154, 192
Nothorhina muricata, 74
Notocelus roborana, 47, 121, 154, 192
Num moth (Lymantria monacha), 191
Nut fruit tortrix (Laspeyresia splendana), 91
tortrix (Laspeyresia amplana), 191
weevil (Ceratium nucum), 191
Nymphula depunctalis, 91
fluctuosalis, 191
Nylius minor, 215
vinitor, 109, 125, 130, 166, 179
Oak bud moth (Coleophora latipennella), 112
lea beetle (Haltica quercetorum), 112
procession moth (Cethegoampa processionea), 112
scales (Asterolecanium variolosum), 112
Oat gall midge (Mayetiola arenaria), 222
Oberea linearia, 12, 96, 133, 220
oculata, 125, 130
Oblong leaf weevil (Phyllobius oblongus), 125
Ochsenheimeria laevigata, 125
Oecinara dilectula, 103
levinii, 99
signifera, 103
Oeceria detrita, 154
Ocnerostoma pininariae, 76
Oecophora montana, 33
Odonaspis (Aspidiotus (Odonaspis)), 24, 100
Odonasius australasicus, 55
playfera, 112
pruni, 112
Ecanthus indicus, 205
Eorhabdus olivella, 157
Edaleus infernalis, 205
nigrofasciatus, 205
Oleneaeanthus binotata, 103
Olethreutes cynocephala, 112
keryniana, 79
pruiniana, 177
variegana, 179
Oihatrus oryzae, 206
Olive fly (Dacus oleae), 206
moth (Prays oleellus), 206
white fly (Aleurobolus olivinus), 206
Omiodes accepta, 206
Omphisa anastomosalis, 209
Onocleptus quadrirugatatus, 90
Onion fly (Eumerus sanguinosa), 90
maggot (Hylemyia antiqua), 90
thrips (Thrips tabaci), 206
Opalrum (Opalrum), 81
Ophonus pubescens, 81
Ophiobolus cretacea, 212
Ophiocordycebus conicus, 99
fibularis, 99
globosus, 99
maculatus, 99
maculatus, 99
murelli, 99
nigrum, 99
plasformus, 99
serato, 99
spinosa, 99

INSECT INDEX.
INSECT INDEX.

<table>
<thead>
<tr>
<th>INSECT INDEX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opisthoscelis subrotunda</td>
</tr>
<tr>
<td>verrucula</td>
</tr>
<tr>
<td>Opogonia spicata</td>
</tr>
<tr>
<td>aurigamnos</td>
</tr>
<tr>
<td>dominantia</td>
</tr>
<tr>
<td>fimicota</td>
</tr>
<tr>
<td>saccharata</td>
</tr>
<tr>
<td>Ophrys florum</td>
</tr>
<tr>
<td>Orange rust nite (see Eriophyes olivovus)</td>
</tr>
<tr>
<td>Orchestes alarsii</td>
</tr>
<tr>
<td>decoratus</td>
</tr>
<tr>
<td>fagi</td>
</tr>
<tr>
<td>ferruginus</td>
</tr>
<tr>
<td>populi</td>
</tr>
<tr>
<td>refus</td>
</tr>
<tr>
<td>salicis</td>
</tr>
<tr>
<td>testaceus scutellaris</td>
</tr>
<tr>
<td>Orenga lanigera</td>
</tr>
<tr>
<td>Orgyia antiqua</td>
</tr>
<tr>
<td>gonoforma</td>
</tr>
<tr>
<td>postica</td>
</tr>
<tr>
<td>Oria musculosa</td>
</tr>
<tr>
<td>Orthезia insignis</td>
</tr>
<tr>
<td>praetosa</td>
</tr>
<tr>
<td>Orthetra alarsis</td>
</tr>
<tr>
<td>Orthonthis cylindrirostris</td>
</tr>
<tr>
<td>klugii</td>
</tr>
<tr>
<td>Orthotomicus cerasus</td>
</tr>
<tr>
<td>Oxyrhynchus (Ostasia).</td>
</tr>
<tr>
<td>Oxya annulicornis</td>
</tr>
<tr>
<td>intrica</td>
</tr>
<tr>
<td>viovisit</td>
</tr>
<tr>
<td>Oxyacresus audegoni</td>
</tr>
<tr>
<td>gossipirous</td>
</tr>
<tr>
<td>hyalinipennis</td>
</tr>
<tr>
<td>laticia</td>
</tr>
<tr>
<td>Ozythrips binervis</td>
</tr>
<tr>
<td>Ozythrips funesta</td>
</tr>
<tr>
<td>Oyster-shell scale (see Lepidosaphes nimi).</td>
</tr>
<tr>
<td>Pachnaeus azurescens</td>
</tr>
<tr>
<td>littus</td>
</tr>
<tr>
<td>Pachylisssus serricus</td>
</tr>
<tr>
<td>Parcymenurus chinensis</td>
</tr>
<tr>
<td>quadrimaculatus</td>
</tr>
<tr>
<td>Pachyrhina crocata</td>
</tr>
<tr>
<td>quadula</td>
</tr>
<tr>
<td>Pechyes sulcicollis</td>
</tr>
<tr>
<td>Pachytilus migratorios</td>
</tr>
<tr>
<td>migratorius</td>
</tr>
<tr>
<td>Pachyanca pharopthalmus</td>
</tr>
<tr>
<td>Painted apple moth (see Teia anarotiae).</td>
</tr>
<tr>
<td>Palicococcus fuscepinenis</td>
</tr>
<tr>
<td>rosea</td>
</tr>
<tr>
<td>Palenbus ourtaris</td>
</tr>
<tr>
<td>Palm weevil (see Rhynchophorus palmarum).</td>
</tr>
<tr>
<td>Pamphila dana</td>
</tr>
<tr>
<td>Pamphylus flaviventris</td>
</tr>
</tbody>
</table>

Page |
--- |
| 240 |

Panolis griseoarceata | 71 |
| Papaya fruit fly (see Tzardrypnea curvicuda). |
| Papilio demoleus | 57 |
| idaes | 60 |
| Paralecanium coecophylae | 162 |
| expansum | 102 |
| geometricum | 35 |
| Parapalpus modesta | 191 |
| Paraphyurus granulosus | 153 |
| Parasa lepidola | 64 |
| Paratetris gracios | 205 |
| singularis | 205 |
| Parlatoria affinis | 23, 26, 156, 166 |
| blanchardi | 162 |
| callainantha | 23, 24, 35, 59, 166, 168, 192 |
| cinceria | 59 |
| greeni | 162 |
| myrurus | 219 |
| miltiaspisformis | 158, 162 |
| proteus | 5, 158, 162 |
| vesicenca | 192 |
| pseudaspisodus | 5, 146, 155 |
| pyri | 29, 169 |
| sinensis | 59 |
| ziziphus | 5, 159, 131 |
| Parnara mathias | 191, 208 |
| Paropsis picea | 10 |
| Parthenothrips (?) kouwisi | 207 |
| Pea aphis (see Macrosiphum pisi). |
| midge (see Conarinia pisi). |
| moths (see Laspeyreras spp.). |
| pod borer (see Etiella zinckenella). |
| weevils (see Mylabris (Bruchus) spp.). |
| Peach fruit fly (see Dacus persica). |
| Pear borer (see Agrilus sinuatus). |
| fruit borer (see Nephopteryz rubriconella). |
| gall midge (see Conarinia pyrivora). |
| leaf blister mite (see Eriophyes pyri). |
| curling midge (see Dasineura pyri). |
| scale (see Aspidotus ostreiformis). |
| thrps (see Thelonothrips pyri). |
| tings (see Stephanitis pyri). |
| tree psylla (see Psylla pyricola). |
| Pectinophora gossypiella | 88 |
| Fedélinae femorals | 43, 216 |
| Pempoyma [see Ocrotaphila (Pempeoma) spp.). |
| Peltopora pedicellata | 108, 172 |
| Pemphigus bursarius | 151 |
| floginis | 151 |
| immunes | 151 |
| marusqiophilis (see P. floginis). |
| napes | 151 |
| vesicalis | 151 |
| Pentalodon punctatus | 216 |
| Perak pomelo moth (see Nefopteryz sagittiferella). |
| Pederina sp. | 6 |
| Pericosus mundulus | 207 |
| Perkinthella spp. | 206 |
| amboinensis | 206 |
| bicoloris | 206 |
| graminicola | 206 |
| tanakensis | 206 |
| patilidula | 206 |
| papuennis | 206 |
INSECT INDEX.

Page.

Phyllobius oblongus ........................................ 110
pyrrh. .................................................. 46
sinuatus .................................................. 46
u. .......................................................... 39
viridicollis ................................................ 39

Phyllocnistis citrella ...................................... 58
Phyloidea .................................................. 221
tibialis ................................................... 221
ticellina .................................................... 6, 161, 221
vulgissima ................................................ 221

Phylomphastia diomysius ................................ 190
Phylocorpa horticola .................................... 109
Phylophaga clypealis .................................. 193
problematica ............................................. 193

Phylloptomon vagans ...................................... 13
Phylloptera spp .......................................... 91
armacole .................................................. 6, 91, 138
atra .......................................................... 44, 91, 138
 crucifera .................................................. 41, 91
nomorum .................................................. 44, 91, 137, 180
nigripes ................................................... 44, 91, 138
undulata ................................................... 91
citata ........................................................ 6
vittata ....................................................... 44, 126, 187

Phymatodes lindula ....................................... 135, 193, 222
testaceus .................................................. 155

Physoderms picear ........................................ 81
Physopus sexnotatus ...................................... 207
Phygius smithii ............................................ 199
Phyocoris paludinus ..................................... 184
Phyomyza affinis .......................................... 51, 53, 164, 165, 215
nigricornis (see P. affinis).

Phytodonos (see Pyrana). ................................. 7, 124
Phytophaga destructor .................................... 7, 124

Phytocoris formosanus .................................. 207
Piesarthrius marginellus .................................. 10

Pieris montae ............................................. 19

Pigmy mangold beetle (see Atanaria linearis). ....... 10

Pileus hyalinatus .......................................... 10

Pine bark beetle (see Xylotrechus quadripes). ....... 10
bud and gall moths (see Ectria spp.).
gall moth (see Leptis dodecalis).
galile (see Eriophyes pini).
gall midge (see Thecodiplosis brachytera).

P. orientalis ................................................ 67
pint .......................................................... 67
sibiricus .................................................... 67
strobi ........................................................ 67

Pink bollworm (see Pectinophora gossypiella).

Phthirius ericetorum ...................................... 215
Phycaea cincta ........................................... 52, 70
Phyide nana ................................................ 91
Phylocids sp ............................................... 91
Phyloplaga globosa ...................................... 73, 153
Phylophaga fagi .......................................... 39
Phylophaga exergetatus .................................. 39
betula ........................................................ 46
maculicornis .............................................. 17, 46

Page.

Perkinsella rattle ........................................ 206
saccharicida .............................................. 198, 206
sinensis .................................................... 206
variegata .................................................. 206
vandalis .................................................... 206
viitenisia ................................................... 206

Peronias ferrugana ....................................... 12, 40, 47
Passerina evansi ......................................... 185

Peruvian cotton-square weevil (see Antho-
nomus vestitus).

fruit fly (see Anastrepha curvipes).  

potato weevil (see Trypodendron latithorax; Premnotropses solani).

Perognatha gigas spinosa ................................ 103
Phloxps cynana ............................................ 73
Phlegra bupheal .......................................... 12, 40, 47
Phalina cynuta ............................................ 104
Phaonia trimaculata ..................................... 49
Pharionotha kirchii ...................................... 122
Phenacopsia (see Chimaera (Phenacopsia)).

Phenacopsia aceris ....................................... 11, 134, 222
iceryoides ................................................ 146
manipera ................................................... 146
pergendel ................................................... 147
picea ......................................................... 81
societis ..................................................... 121

Phenacopsia aceris ....................................... 39
Phenix maculosis ......................................... 206
moesta ........................................................ 206

Philoptera aceris .......................................... 50
Philippine orange moth (see Prays citri).

Philesana interrupta ....................................... 205
Phlecoea infundata ...................................... 205
Phlebophorus spinulosus ................................ 81
rhododactylus ............................................ 81

Phloxopus thujae ........................................... 25, 140
zhobi ......................................................... 74

Phloeothrips lucasseni ................................... 207
olae .......................................................... 156
pallidicornis .............................................. 207

Phloeotribus caucasicus ................................ 27
olae .......................................................... 157

Phlyctemia decepta ....................................... 210
ferrugalis .................................................. 6, 44

Phloxicea spinulosus ..................................... 182
Phrancotoma recurva ..................................... 97
triscups ...................................................... 97

Phorbia vicina (see Chortophilia (Pepomia)
yrosynta). .................................................

Phorodon humuli ........................................... 5
Phospha apparatus ........................................ 43
Phryneta coca ............................................. 195
conradii ..................................................... 103
hephora ...................................................... 195
spinator ..................................................... 103

Phthiricema opercula .................................... 216, 217
Phylcta abietella .......................................... 52, 70
infusella ..................................................... 91
Phylatis sp .................................................. 91
Phyphax globosa ......................................... 73, 153
Phylaphis fagi ............................................ 39
Phyllophaga argyrotatus ................................ 39, 46
betele ........................................................ 46
maculicornis .............................................. 17, 46

Page.

27812—18—16
INSECT INDEX.

Pissodes pini .............................................. 68
pini-phylus .............................................. 68
Pitchy-legged weevil (see Brachytothrus piepe). 6
Pith moth (see Blastodacna spp.).
Pityogenes bidens ........................................... 69
bistrifidus .............................................. 69
chalegraphus ........................................... 69
cisfer .............................................. 52, 69
lipperti .............................................. 74
plidens .............................................. 69
quadridens ........................................... 69
trepantus ............................................ 74
Pityokteines curidens ...................................... 69
spindens .............................................. 79
vorontzovii ............................................. 79
Pityophthorus exsulphus ..................................... 81
glabratus .............................................. 75
lichtensteinii .......................................... 75
micrographus ........................................... 69
sampsoni .............................................. 74
Plantia affinis ............................................. 190
Plateros dispallens ........................................ 212
Platinglia noakii ........................................... 35
Platypteryx peeopi theater .................................. 29
Platypterus biformis ......................................... 75
capitulum ............................................. 215
curtus ................................................. 194
ciprindus .............................................. 154
talurex ................................................ 194
Plcoperera refraea ........................................... 105
Plemeliella abietina ......................................... 78
Plocoderus obesus ........................................... 193
ruficornis .............................................. 143
Plodia interpunctella ......................................... 6
Plum blister mites (see Eriophyes spp.).
borer (see Rhyynchites cupreaus).
bud moth (see Olethreutes pruniana).
fruit sawfly (see Hoplocl部委 fultecornis).
leaf sawfly (see Ploiphara padi).
stem piercer (see Magalis armagica).
psiya (see Pysila pruni).
sawfly (see Eriocampoides ilmacina).
Plusia argiriferia ........................................... 216
chalicites .............................................. 210
Gamma .............................................. 6, 44, 216
nigrisigna .............................................. 14
Plutella maculipennis ......................................... 69
Podisma alpina ............................................. 11
Podonta 14-punctata ......................................... 103
Pecionlona rutileus (see Lampra).
varioseta ............................................. 181, 222
Pagonochrus fasciculatus ..................................... 65
Polasaeps cecidis ............................................ 162
Poinia ......................... 75, 79
Pollenia pollinii ............................................. 156
Polychrois botrana ........................................ 130, 131
Polydrusus cervinus .......................................... 39, 46
chiorodruxis ............................................ 73
chrysoniela ............................................. 39
grisomaculatus ........................................... 39
intermedius ........................................... 46, 73
lateralis .............................................. 39
micans .............................................. 39
molits ................................................ 39
Page.

Polydrusus picus ............................................ 39
planipennis .............................................. 46
scriecis .............................................. 46, 39
undatus .............................................. 46, 73
villarosis .............................................. 73
viridecollis ............................................. 6, 39
Polygraphus uterinus ........................................ 52
grandicola .............................................. 75
himalayanis ............................................. 75
longifolia .............................................. 75
major .............................................. 52, 69
nigra ................................................. 75
pini ................................................ 69
polygraphus ............................................. 69
subopacus .............................................. 70
trecchi .............................................. 75
Polyphoca sacharicola ...................................... 204
Polyphylia fullo ........................................... 10, 39, 46, 73
Pomatia salicis ............................................ 223
Poncia rapae ............................................... 6
Poplar borers (see Saperda spp.).
curculio (see Cryptothyrus lapathi). 124
Porricondyla cerealis ........................................ 124
gossypii .............................................. 89
Porter’s white fly (see Alcurohcirius porteri). 107, 137, 141, 148, 194, 154, 181, 223
Porthesia similis ............................................ 40, 47, 108,

virguncula .............................................. 91
Porthetria dispar ............................................. 6, 12, 40, 47,

77, 107, 137, 141, 148, 154, 181, 223
Potato lady-bird beetle (see Epilachna spp.).
root mite (see Rhizoglyphus echinopae).
Proneilea melavata ........................................... 59, 63
Prays citrul tus .............................................. 57
oletius ................................................. 155
Premnophyes solani ........................................... 184
Prioanus cormulans .......................................... 153
Priophora padi ............................................ 47, 133, 149, 170, 177, 179
Prochephitus buneliz ......................................... 26, 78
Procodea adara .............................................. 208
Prodenia lutila ............................................. 14, 91, 191, 216, 217
Prometheoa cumingii ......................................... 160
reich ................................................. 160
Prosteron holoscricus ........................................ 153
Protodiaspis anomala ........................................ 9
Pseudis secures ............................................. 205
Psalidium maxillosum ....................................... 44
Psammocerae trimecutus ...................................... 33
Psedsanodina [see Aspidiotus (Psedsanodina)]. 171
Psedchapsis [see Aspidiotus (Psedchapsis)]. 182, 223
Psedochellariu arbix ........................................ 182, 223
Pseudococcus accisic ........................................ 9
abhisbix ............................................. 10
ananassx ............................................. 171
arec ................................................. 121
aurilatans .............................................. 25
bonivos .............................................. 206
breepes .............................................. 171
brometix .............................................. 94, 171, 206
cailecarlin ............................................. 206
citri ............................................... 59
cocotis .............................................. 163
coffer ............................................... 63
dubia ............................................... 163
INDEX.

INSECT.

Rhopalopus insubricus ........................................ 148

Rhynechites aini ............................................... 39

betulax .................................................. 12, 39, 46
correus .................................................. 173
cruicus .................................................. 173, 174

Rhynochus ater .............................................. 68

Rhynochus cylindricus ...................................... 68

elongatus .................................................. 68

hinalayasensis ........................................... 52, 68

tignarius .................................................. 40, 68

porcacus .................................................. 68

strangulatus .............................................. 68

truncorum .................................................. 40, 68

Rhynochus ferrugineus ..................................... 181

palmarum .................................................. 161, 207

signaticollis (see Rhynechus ferrugineus).

Ricinia tarniata ............................................... 206

Rice bug (see Lepocorisa variicoloris).

flea-beetle (see Chactocnema basilis).

leaf-beetle (see Hispa xenescens).

hopper (see Tettigonidula spectra).

skipper (see Parnara mathias).

stem borer (see Chilo auricilia; Schoenoabis bipunctifer).

Riza musae .................................................. 34, 118

Ripersis fugi ................................................. 39

palmarum .................................................. 163

sterna ...................................................... 206

Riptortus fasciatus ......................................... 207

Rose sawfly (see Ulroa antelipsis; Cladius pectinicornis).

scale (see Lecanium japonica).

Rosenbergia mcquephala .................................. 103

Rusy rustle (see Hydracia micza).

Rust-red flour beetle (see Tylobius ferrugineus).

Rutherfordglen bug (see Nyius siuitor).

Rye midge (see Lasioptera cerealis).

stem borer (see Ochsenheimera laurilla).

Sacodades pyralis ........................................... 50

Sago palm scale (see Diaspis zamirae).

Sabella dortina .............................................. 50

Saissetia dissectalis ........................................ 50

mirifica ...................................................... 10

nigra ...................................................... 63, 94, 102

oliv ......................................................... 5

psilid ...................................................... 131, 114

punctitiffa ................................................ 146

San Jose scale (see Aspidiotus permchiedii).

Saperda spp ................................................. 180

carbarinis ............................................... 6, 159, 181, 222

carunculata ............................................... 180, 181, 182, 222

carbrit .................................................. 23, 39, 179, 180, 181, 220

Sawfly (see Macroptha punctum-album).

Saw-toothed grain beetle (see Siletius surinamensis).

Scale insects (see Coccidi).

Scaphirrhox didactylus .................................... 49

Scelodota striiformis .................................... 128

Schistococcus aubioideus ................................ 193

Schizaphis lobata .......................................... 102

Schizoneouxius monstrosus ............................... 89, 90, 215

Schoenobius bipunctifer ................................ 169

Sciopteron palustris ....................................... 130

tabaniiformis .............................................. 151

Sceirphaga auriflava .................................... 208

chrysorhaca ................................................ 208

Page.

Scirpophaga intucta ........................................ 208

moomistigma .............................................. 208

Sclycoteclus enaever ...................................... 96

Sclycoteclus kirschi ...................................... 96

multitriatrit .............................................. 27

Sclycoteclus darjeelingi .................................. 154

himalayensis ............................................... 79

Scyltus acris ............................................... 148

ampacuti ................................................... 25, 167

assimilis .................................................. 174

carpini ...................................................... 137

diodara ...................................................... 32

inricatus .................................................. 49, 154

lavic ......................................................... 96

major .......................................................... 52

malle ......................................................... 24, 54, 96, 149, 179

minor .......................................................... 52

multitiratrit ................................................ 96

pruni ......................................................... 21, 170, 174

pyramus ...................................................... 96

ratzeburgii .................................................. 46

rugulosus ..................................................... 6, 66, 145

sclylctus .................................................... 27, 96

Scopelosoma satellita ..................................... 40

Scotinophora tarsalis ..................................... 207

See-l-corn maggot (see Chortopha (Pegomya)

fucisepe).

Sclerosoma xineus .......................................... 68, 153

Sclidosema carcn risa ..................................... 10

lycicaria ..................................................... 10

Semiothisa liturata ........................................ 75

Serenitha formosa .......................................... 207

Serica asamensis .......................................... 193

Serropalpia borbas .......................................... 67

Scelania cactic ............................................. 85, 196, 203

nonaginoides ................................................ 208

Sesia conopiformis ........................................... 14

culiciformis ................................................ 12

formiciformis ............................................. 223

myoponiformis ............................................. 21, 25

scolitiformis ............................................... 47

speciformis ................................................ 12, 27, 47

vespiformis ................................................ 154

Setisia incolorina .......................................... 73

laveis ......................................................... 193

semiopeca ................................................... 68

semivalga .................................................... 193

Shallot fly (see Chortopha cilicurva).

She-oak root-borer (see Stigmodes heros).

Shot-hole borer of tea (see Xyleborus formica
tus).

Siameese grain beetle (see Lophochorces (Otto-
ma) pusillus).

Silky oak weevil borer (see Aesiothes notabilis).

Sipla obcura ............................................... 43

Silvanus advena .............................................. 212

varinamensis ............................................... 5

Sinozygmopana analis ...................................... 33, 148, 190, 218

crosum ....................................................... 148, 193, 218

perforans ................................................... 96, 127, 132, 133

scutentatum ................................................ 127

sudamericana .............................................. 100

Siphonetta pumillionis ..................................... 5

Sisir gigan .................................................... 52

imperialis ................................................... 52

jucnus ......................................................... 70

spectrum ..................................................... 70, 82

Sitodrepa panicea ........................................... 5
<table>
<thead>
<tr>
<th>Page</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silona spp.</td>
<td>60</td>
</tr>
<tr>
<td>flavescens</td>
<td>6, 83, 60, 165</td>
</tr>
<tr>
<td>hirsipula</td>
<td>6, 60, 165</td>
</tr>
<tr>
<td>lineata</td>
<td>33, 95, 165</td>
</tr>
<tr>
<td>linnellus</td>
<td>60</td>
</tr>
<tr>
<td>meliolis</td>
<td>61</td>
</tr>
<tr>
<td>melacma</td>
<td>61</td>
</tr>
<tr>
<td>sulcifrons</td>
<td>6</td>
</tr>
<tr>
<td>Sitotroga cereatella</td>
<td>14</td>
</tr>
<tr>
<td>Smynthurus sp.</td>
<td>113, 219</td>
</tr>
<tr>
<td>Social pear sawfly (see Pamphilius flavicen- tris)</td>
<td>39</td>
</tr>
<tr>
<td>Solenococcus fagi</td>
<td>130, 219</td>
</tr>
<tr>
<td>muratae</td>
<td>130, 219</td>
</tr>
<tr>
<td>South Sea guava fruit fly (see Dacus psilid)</td>
<td>39</td>
</tr>
<tr>
<td>Soy bean moth (see Laspeyresia glaucovirens)</td>
<td>36</td>
</tr>
<tr>
<td>Spermothorax pectoralis</td>
<td>10</td>
</tr>
<tr>
<td>Sphocroccus aconstates</td>
<td>193</td>
</tr>
<tr>
<td>Sphocrasytes usamakense</td>
<td>193</td>
</tr>
<tr>
<td>globulosus</td>
<td>193</td>
</tr>
<tr>
<td>alicanticus</td>
<td>193</td>
</tr>
<tr>
<td>Sphenophorus sordidus (see Cosmopterines)</td>
<td>52</td>
</tr>
<tr>
<td>Sphenoptera alvirea</td>
<td>92</td>
</tr>
<tr>
<td>gossypii</td>
<td>92</td>
</tr>
<tr>
<td>laferiei</td>
<td>90</td>
</tr>
<tr>
<td>neglecta</td>
<td>90</td>
</tr>
<tr>
<td>Spilosoma fuscinula</td>
<td>99</td>
</tr>
<tr>
<td>Spinacis aphis (Mygus persicus)</td>
<td>8, 91, 210, 216</td>
</tr>
<tr>
<td>leaf miner (see Pogonomy mayscutellum)</td>
<td>208</td>
</tr>
<tr>
<td>Spined log beetle (see Xenoecymia spinipes australis)</td>
<td>208</td>
</tr>
<tr>
<td>Spiny citrus whitefly (see Aleyrodes woollumi)</td>
<td>208</td>
</tr>
<tr>
<td>Spodoptera maurita</td>
<td>208</td>
</tr>
<tr>
<td>Spruce bark beetle (see Laspeyresia pac- tovira)</td>
<td>51, 64, 146, 212</td>
</tr>
<tr>
<td>borer (see Tropinota hirta)</td>
<td>51, 64, 146, 212</td>
</tr>
<tr>
<td>cone moth (see Laspeyresia stridula)</td>
<td>51, 64, 146, 212</td>
</tr>
<tr>
<td>gall mgge (see Diasysta picea)</td>
<td>52</td>
</tr>
<tr>
<td>nest worm (see Laspeyresia pedulaa)</td>
<td>52</td>
</tr>
<tr>
<td>wood wasp (see Sirex spectrum)</td>
<td>52</td>
</tr>
<tr>
<td>Silius alternus</td>
<td>35, 61, 146, 212</td>
</tr>
<tr>
<td>Sigmapolyxyba (see Enormiia rufimaculata)</td>
<td>59</td>
</tr>
<tr>
<td>Sterinota simplicata</td>
<td>205</td>
</tr>
<tr>
<td>Stenobothrus foraminosus</td>
<td>198</td>
</tr>
<tr>
<td>Stenocera sarcitariora</td>
<td>206</td>
</tr>
<tr>
<td>sacchari</td>
<td>206</td>
</tr>
<tr>
<td>Stenothrips (?) zohntneri</td>
<td>207</td>
</tr>
<tr>
<td>Stephanitis pyri</td>
<td>167, 168</td>
</tr>
<tr>
<td>Sternotomis crassipes</td>
<td>143, 144</td>
</tr>
<tr>
<td>mangiferae</td>
<td>143, 144</td>
</tr>
<tr>
<td>Sternotomis boehemani</td>
<td>10</td>
</tr>
<tr>
<td>imperialis</td>
<td>63</td>
</tr>
<tr>
<td>regalis</td>
<td>63</td>
</tr>
<tr>
<td>Stigmoreda heros</td>
<td>97</td>
</tr>
<tr>
<td>Stilpnotis salicis</td>
<td>181, 223</td>
</tr>
<tr>
<td>Stomaphis longirostris</td>
<td>152</td>
</tr>
<tr>
<td>squreus</td>
<td>152</td>
</tr>
<tr>
<td>Straw fly (see Chloridae stenopias)</td>
<td>20</td>
</tr>
<tr>
<td>Strawberry root weevil (see Brachyrhinus ovatus)</td>
<td>20</td>
</tr>
<tr>
<td>Stromatium barbatum</td>
<td>46</td>
</tr>
<tr>
<td>longicorne</td>
<td>46</td>
</tr>
<tr>
<td>Strongboides fuscus</td>
<td>90</td>
</tr>
<tr>
<td>Strongboides orarius</td>
<td>90</td>
</tr>
<tr>
<td>Strongboides thoracicus</td>
<td>52</td>
</tr>
<tr>
<td>Strophosoma capitata</td>
<td>39, 46</td>
</tr>
<tr>
<td>melanopraema</td>
<td>39, 46</td>
</tr>
<tr>
<td>Subocella concolor</td>
<td>30, 132, 194</td>
</tr>
<tr>
<td>Subocella brunetetata</td>
<td>14, 43</td>
</tr>
<tr>
<td>Sucking bug (see Catothrips variabilis)</td>
<td>206</td>
</tr>
<tr>
<td>Sugar-cane ambrosia beetle (Xylotreinus per- forans)</td>
<td>206</td>
</tr>
<tr>
<td>borer (see Metanusa saccata)</td>
<td>206</td>
</tr>
<tr>
<td>mottos (see Diatoma spp.)</td>
<td>206</td>
</tr>
<tr>
<td>bud moth (see Euretaea flavistriata)</td>
<td>206</td>
</tr>
<tr>
<td>Unagropsis hoppe (see Tomaspis spp.)</td>
<td>206</td>
</tr>
<tr>
<td>hispid miner (see Hispida wakkeri)</td>
<td>206</td>
</tr>
<tr>
<td>leafhopper (see Perkinsiella sacchari)</td>
<td>206</td>
</tr>
<tr>
<td>meaty bug (see Pseudococcus tessellis)</td>
<td>206</td>
</tr>
<tr>
<td>moth borer of India (see Chilo simplex)</td>
<td>206</td>
</tr>
<tr>
<td>red spider (see Tetranychus cinnabari)</td>
<td>206</td>
</tr>
<tr>
<td>Swete-potato stem borer (see Omphisa anas- tamelaunala)</td>
<td>81</td>
</tr>
<tr>
<td>weevils (see Cylas formicarius)</td>
<td>81</td>
</tr>
<tr>
<td>Swan moth (see Porthea similis)</td>
<td>81</td>
</tr>
<tr>
<td>Sylepta decogata</td>
<td>91, 155</td>
</tr>
<tr>
<td>Symphyletes neglectus</td>
<td>10</td>
</tr>
<tr>
<td>nigrivirens</td>
<td>10</td>
</tr>
<tr>
<td>vestigialis</td>
<td>10</td>
</tr>
<tr>
<td>Syngamus parvula</td>
<td>81</td>
</tr>
<tr>
<td>Tacharda acinia</td>
<td>10</td>
</tr>
<tr>
<td>foci</td>
<td>103</td>
</tr>
<tr>
<td>tocca</td>
<td>103</td>
</tr>
<tr>
<td>Tetreatia scatorias</td>
<td>101</td>
</tr>
<tr>
<td>Tetlandris pyri</td>
<td>5</td>
</tr>
<tr>
<td>Takahashia cirticola</td>
<td>59</td>
</tr>
<tr>
<td>japonica</td>
<td>59</td>
</tr>
<tr>
<td>Tanytremus rusticus</td>
<td>207</td>
</tr>
<tr>
<td>Taphoerys biocolor</td>
<td>40, 170</td>
</tr>
<tr>
<td>villiforms</td>
<td>40</td>
</tr>
<tr>
<td>Tapinostola musculosa (see Oria)</td>
<td>91</td>
</tr>
<tr>
<td>Tarache calena</td>
<td>91</td>
</tr>
<tr>
<td>Tarpionia (see Aspidiotus (Tarponia))</td>
<td>91</td>
</tr>
<tr>
<td>Tarnished plant bug (see Lygus pratensis)</td>
<td>91</td>
</tr>
<tr>
<td>Tea bug worms (see Psycha spp.)</td>
<td>91</td>
</tr>
<tr>
<td>Tea bag worms (see Psycha spp.)</td>
<td>91</td>
</tr>
<tr>
<td>Teracerea flavistriata</td>
<td>10, 100</td>
</tr>
<tr>
<td>Teia asiaticola</td>
<td>10, 24, 113, 179</td>
</tr>
<tr>
<td>Teledapsoi korolovici</td>
<td>52, 81</td>
</tr>
<tr>
<td>Telotis hyperborea</td>
<td>208</td>
</tr>
<tr>
<td>Tenebrionidae boitanianica</td>
<td>5</td>
</tr>
<tr>
<td>Tephritidae (see Dacus (Tephrita))</td>
<td>206</td>
</tr>
<tr>
<td>Termes australis</td>
<td>15, 59, 99</td>
</tr>
<tr>
<td>Termes nivosa</td>
<td>99</td>
</tr>
<tr>
<td>Termites (see Termiteidae)</td>
<td>99</td>
</tr>
<tr>
<td>Termitidae</td>
<td>73</td>
</tr>
<tr>
<td>Tettogonia albida</td>
<td>206</td>
</tr>
<tr>
<td>ferrugina</td>
<td>206</td>
</tr>
<tr>
<td>viridis</td>
<td>190, 206</td>
</tr>
<tr>
<td>Tetramorium eminum</td>
<td>95</td>
</tr>
<tr>
<td>Trochicola biocolor</td>
<td>95</td>
</tr>
<tr>
<td>bicornis</td>
<td>95</td>
</tr>
<tr>
<td>Trunanthus micranthus</td>
<td>197</td>
</tr>
<tr>
<td>biocolor</td>
<td>197</td>
</tr>
<tr>
<td>Triturus micranthus</td>
<td>197</td>
</tr>
<tr>
<td>eucolor</td>
<td>197</td>
</tr>
</tbody>
</table>
Tetranychus telarius .................................................. 43
Tetranychus castaneum ........................................ 65, 68
arscica .............................................................. 79
Tettigonistes spectabilis ........................................ 52
Tettix formosanus .................................................. 190
Thalasina clara ...................................................... 205
Thaumatomyia minuta ............................................. 10
Tetanonaema senarinsi ........................................... 120
Thecodiplosis brachypodeta .................................... 72
Thilopterus octoguttatus ........................................ 64
Three-striped fruit fly (see Dacus diversus) ............. 205
Thrips (see Thysanoptera.) .................................... 180
Thrips minutus ....................................................... 207
saccari ............................................................... 207
serata ................................................................. 207
stabel ................................................................. 5
Thysanoptera ....................................................... 7
Timber beetle (see Xacrides melanaura) .................. 190
Tinea granella .......................................................... 6, 123
Tipula alereca ..................................................... 14
paltudow ............................................................. 14
Tischria complanella ............................................. 54, 154
simplionella .......................................................... 154
Tobacco stem borer (see Gnorimoschema helleri-opya) .......................................................... 207
white flies (see Aleurodes spp.) .................. 85, 197, 198
Tomaspis lepidior .................................................. 85, 197, 198
postica ................................................................. 85, 197, 198
Tomato weevil (see Desiantina nocita) ................. 205
Tomius (Myctiphilus) minor .................................... 60
piniperda ............................................................. 60, 69
Tonga fruit fly (see Dacus tongensis) ...................... 22
diruleana ............................................................. 14
histrionaena .......................................................... 82
muritana .............................................................. 79
picana ................................................................. 70
podana ................................................................. 27, 40
viburniana ............................................................ 70
viridana ............................................................... 54, 152
Toxorhypea curvicauda ........................................... 165
Trabala vishnu .......................................................... 194
Trachea brasiliana .................................................. 125
Tragophaeta senatoria ........................................... 50
Trialeurodes vaporariorum ................................. 215
Tribolium castaneum ............................................. 33
confusum ............................................................. 5, 33
ferrugineum ........................................................... 6
Trichetra marginalis ............................................... 100
Trechochromus virginalis ...................................... 182
Trichiosoma lacorum ............................................. 13, 47, 223
Trichocera haeimalis ............................................. 219
Trichopetalus flavomaculatus ............................... 205
Triplonius hanti .................................................... 205
Triplonius annulata .............................................. 205
Triplonius americana ............................................ 52
Triplonius cribiformis .......................................... 216, 218
Tropidocera spp. ................................................... 180
anamathiforms ..................................................... 180
apiformis .............................................................. 180
Tropidocera brunneicapillus ................................ 205
formosana ............................................................. 205
saccariocorpa ....................................................... 206
Tryphocharinus vectorius ..................................... 98
Tryphochalinus alius .............................................. 12
Tryphromyza latitatorius ..................................... 184
Trypanis nasuta .................................................... 205
Turnip flower beetle (see Meligethes arenarum) ..... 180
sawfly (see Athalia spinipennis) ............................. 180
Twig caterpillar (see Rhyynchites corrulicus) ........ 190
Urothrips acus ........................................................... 24, 166, 179
biritira ................................................................. 10
cynthia ................................................................. 59
simulans .............................................................. 10
stripus ................................................................. 10
triangularis .......................................................... 10
Vesperus spp ........................................................... 127
luridus ................................................................. 127
mauritanicus ........................................................ 127, 157
strepsens ............................................................. 127, 192
zatarri ................................................................. 127
Viburnum scale (see Chrysomphalus perseci) ........... 180
Victoria bean beetle fly (see Zicera labradus) ...... 205
white ant (see Termes australis) ......................... 180
Vine feast-beetle (see Haltica amphilophaga) ....... 103, 146
Vinsonia stellifera ................................................... 112, 182, 142, 180
Vivchala inocrates .................................................. 112, 152, 142, 180
vivida ................................................................. 163, 180
Watercress caddis worm (see Limnephilus flavicornis) .......................................................... 8
Weevils ................................................................. 8
West Indian cane fly (see Stehnoctinus sao- charitores) ........................................................... 190
sugar-cane borer (see Metama- sius hemipterus) ..................................................... 190
sugar-cane root borer (see Dia- preps abbreviatus) .................................................. 190
sweet-potato weevil (see Eucos- pes batazit) ........................................................... 190
Wheat bulb fly (see Hylemyia coarctata) ................. 205
moth (see Tinea granella) ........................................ 190
plant louse (see Aphis avenue) ............................. 205
stem borer (see Nonagria uniformis) ...................... 205
White ant (see Coptotermes gestroli) ...................... 205
Willow curculio (see Cryptorrhynchus lapathi) ..... 205
gall midge (see Hypochlorus spp.) ......................... 205
leaf beetles (see Cryptophila aurata; Phyllophaga spp.) .......................................................... 205
Winter moth (see Cheimatobia brunata) ................. 205
turnip gnats (see Trichocera haeimalis) ................. 205
Xenosophron spinipes australis ................................ 195
Xicris spectrum .......................................................... 70
Xestobium plumbeum ............................................ 39, 73
yucapitellum .......................................................... 12, 39, 53, 137, 138, 148, 153, 171
Xiphidiu mearnei ..................................................... 190
Xiphystria canescens ............................................. 13, 40
propagata .............................................................. 47
Xosmodera regularis ............................................. 103
Xyleborus americanus .......................................... 193
bengaleicus .............................................................. 62
c渫 ................................................................. 181
dryographus ........................................................ 40, 95, 154
cyphus ................................................................. 75
falter ................................................................. 193
formicatus ............................................................. 211
improbus .............................................................. 154
major ................................................................. 193

INDEX.
### PLANT INDEX.

<table>
<thead>
<tr>
<th>Page</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xylochus stebbingi</td>
<td>153</td>
</tr>
<tr>
<td>Xylotrechus dichotomus</td>
<td>207</td>
</tr>
<tr>
<td>gideon</td>
<td>207</td>
</tr>
<tr>
<td>Yellow box borers (see <em>Phoracantha</em> spp.)</td>
<td></td>
</tr>
<tr>
<td>Zabra gibbus</td>
<td>126</td>
</tr>
<tr>
<td>Zamaca alofaciaria</td>
<td>150</td>
</tr>
<tr>
<td>Zaratha cramerella</td>
<td>50</td>
</tr>
<tr>
<td>Zeuzera cotoneaster</td>
<td>30, 31, 85, 89, 142, 212</td>
</tr>
<tr>
<td>eucalypti</td>
<td>10</td>
</tr>
<tr>
<td>pyrina</td>
<td>10</td>
</tr>
<tr>
<td>6, 12, 27, 40, 46, 48, 96, 138, 141, 149, 154, 181, 223</td>
<td></td>
</tr>
<tr>
<td>Zizyphus labadus</td>
<td>37, 165</td>
</tr>
<tr>
<td>Zonabris florialis</td>
<td>184</td>
</tr>
<tr>
<td>14-punctata</td>
<td>184</td>
</tr>
<tr>
<td>Zophodia convolutella</td>
<td>120, 121</td>
</tr>
<tr>
<td>maculifrons</td>
<td>206</td>
</tr>
<tr>
<td>subrufa</td>
<td>190, 206</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amelanchier loebi</td>
<td>99</td>
</tr>
<tr>
<td>Akebia quinata</td>
<td>170</td>
</tr>
<tr>
<td>campestre</td>
<td>147</td>
</tr>
<tr>
<td>negundo (box elder)</td>
<td>147</td>
</tr>
<tr>
<td>platanoideus (Norway maple)</td>
<td>147</td>
</tr>
<tr>
<td>pseudopterinus (sycamore maple)</td>
<td>147</td>
</tr>
<tr>
<td>Achnas spp. (Achnas).</td>
<td></td>
</tr>
<tr>
<td>Acronychia laris (cheesewood)</td>
<td>114</td>
</tr>
<tr>
<td>Æsculus spp. (horse-chestnut)</td>
<td>6, 12, 126, 137, 138</td>
</tr>
<tr>
<td>hippocastanum (horse-chestnut)</td>
<td>138</td>
</tr>
<tr>
<td>paela (red buckeye)</td>
<td>138</td>
</tr>
<tr>
<td>Agathis australis (kauri)</td>
<td>195</td>
</tr>
<tr>
<td>Alnus spp. (alder)</td>
<td></td>
</tr>
<tr>
<td>Alnus spp. (Alnus)</td>
<td></td>
</tr>
<tr>
<td>Alnus (see <em>Medicago sativa</em>).</td>
<td></td>
</tr>
<tr>
<td>Alnus (see <em>Prosopis</em> spp.)</td>
<td></td>
</tr>
<tr>
<td>Alligator pear (see <em>Persea gratissima</em>).</td>
<td></td>
</tr>
<tr>
<td>Alnus acuminata (shalot).</td>
<td>157, 158</td>
</tr>
<tr>
<td>cepa (onions)</td>
<td>5, 28, 157, 158</td>
</tr>
<tr>
<td>porrum (leek)</td>
<td>28, 157</td>
</tr>
<tr>
<td>rosemum</td>
<td>158</td>
</tr>
<tr>
<td>salviurn (garlic)</td>
<td>28, 157, 158</td>
</tr>
<tr>
<td>sphenoceratium</td>
<td>158</td>
</tr>
<tr>
<td>Almond (see <em>Amygdalus communis</em>).</td>
<td></td>
</tr>
<tr>
<td>Mexican (see <em>Terminalia catappa</em>).</td>
<td></td>
</tr>
<tr>
<td>Tropical (see <em>Terminalia</em> spp.).</td>
<td></td>
</tr>
<tr>
<td>Alnus spp. (alder)</td>
<td>11-12, 65, 107, 108, 138, 150, 151, 221</td>
</tr>
<tr>
<td>glutinosa (black alder)</td>
<td>11</td>
</tr>
<tr>
<td>lancea</td>
<td>11, 12</td>
</tr>
<tr>
<td>nepalensis</td>
<td>12</td>
</tr>
<tr>
<td>rubra</td>
<td>11</td>
</tr>
<tr>
<td>strids (European green alder)</td>
<td>11</td>
</tr>
<tr>
<td>Aloe spp.</td>
<td>169</td>
</tr>
<tr>
<td>Amarantus sp.</td>
<td>42</td>
</tr>
<tr>
<td>Amealochier spp. (service berry)</td>
<td>20, 65, 184</td>
</tr>
<tr>
<td>Amygdalus spp. (peach)</td>
<td>190, 206</td>
</tr>
<tr>
<td>Plant Name</td>
<td>Page</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td><em>Amgdalus communis</em> (almond)</td>
<td>56, 166, 167</td>
</tr>
<tr>
<td><em>persica</em> (peach)</td>
<td>83, 92, 109, 113, 114, 115, 117, 129, 166, 167, 177, 179, 214</td>
</tr>
<tr>
<td><em>persica nucipersica</em> (nectarine)</td>
<td>92, 114</td>
</tr>
<tr>
<td><em>Anacardium occidentale</em> (cashew, wild guava)</td>
<td>109</td>
</tr>
<tr>
<td><em>Ananas sativus</em> (pineapple)</td>
<td>118, 171, 224</td>
</tr>
<tr>
<td><em>Angelica sp.</em></td>
<td>52</td>
</tr>
<tr>
<td><em>Ammona</em> spp. (cushard apple)</td>
<td>83, 93, 94</td>
</tr>
<tr>
<td><em>cherry</em> (cherry)</td>
<td>93, 94, 114</td>
</tr>
<tr>
<td><em>humboldtiana</em></td>
<td>94, 113</td>
</tr>
<tr>
<td><em>muriata</em> (soursop)</td>
<td>62, 93, 94, 115</td>
</tr>
<tr>
<td><em>reticulata</em> (cushard apple)</td>
<td>95</td>
</tr>
<tr>
<td><em>squamosa</em> (sugar apple)</td>
<td>94</td>
</tr>
<tr>
<td><em>Antheocephalus cadamba</em></td>
<td>62</td>
</tr>
<tr>
<td><em>Apium graveolens</em> (celery)</td>
<td>52, 53, 215</td>
</tr>
<tr>
<td><em>Apple</em> (see <em>Malus</em> malus)</td>
<td></td>
</tr>
<tr>
<td>black (see <em>Sideroxylon</em> [Achras] austral.)</td>
<td></td>
</tr>
<tr>
<td>custard (see <em>Ammona squamosa</em>)</td>
<td></td>
</tr>
<tr>
<td>Kel (see <em>Aberia cafraria</em>)</td>
<td></td>
</tr>
<tr>
<td>Malay (see <em>Eugenia malaccensis</em>)</td>
<td></td>
</tr>
<tr>
<td>mammee (see <em>Mammea americana</em>)</td>
<td></td>
</tr>
<tr>
<td>mountain (see <em>Eugenia malaccensis</em>)</td>
<td></td>
</tr>
<tr>
<td>rose (see <em>Eugenia bambous</em>)</td>
<td>94</td>
</tr>
<tr>
<td>star (see <em>Chrysohylum cainito</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Apricot</em> (see <em>Prunus armeniaca</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Araucaria</em> spp.</td>
<td>25</td>
</tr>
<tr>
<td><em>bidwillii</em></td>
<td>25</td>
</tr>
<tr>
<td><em>excels</em> (Norfolk Island pine)</td>
<td>25</td>
</tr>
<tr>
<td><em>Arborvitae</em> (see <em>Thuja</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>Artémisium sp.</em></td>
<td>52</td>
</tr>
<tr>
<td><em>Arceo catechu</em> (betel nut)</td>
<td>44</td>
</tr>
<tr>
<td><em>Arceo latrocann</em></td>
<td>44, 153</td>
</tr>
<tr>
<td><em>Artemisia</em> spp.</td>
<td>52</td>
</tr>
<tr>
<td><em>vulgaris</em> (mugwort)</td>
<td>123</td>
</tr>
<tr>
<td><em>Artocarpus integrifolia</em> (jack fruit)</td>
<td>117</td>
</tr>
<tr>
<td><em>Arundinaria</em> spp. (bamboo)</td>
<td>31, 32, 33</td>
</tr>
<tr>
<td><em>hindii</em> graminis</td>
<td>33</td>
</tr>
<tr>
<td><em>yaponica</em></td>
<td>33</td>
</tr>
<tr>
<td><em>Arundo</em> sp. (reed)</td>
<td>123</td>
</tr>
<tr>
<td><em>Ash</em> (see <em>Fraxinus</em> spp.)</td>
<td></td>
</tr>
<tr>
<td>mountain (see <em>Sorbus</em> spp.)</td>
<td></td>
</tr>
<tr>
<td>white (Szechonia ovata)</td>
<td></td>
</tr>
<tr>
<td><em>Asparagus</em> (see <em>Asparagus officinalis</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Asparagus officinalis</em></td>
<td>29</td>
</tr>
<tr>
<td><em>officialis</em> (asparagus)</td>
<td>5, 6, 27-29, 129, 157</td>
</tr>
<tr>
<td><em>umbellatus</em></td>
<td>29</td>
</tr>
<tr>
<td><em>Aspen</em> (see <em>Populus tremula</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Aster</em> spp.</td>
<td>20</td>
</tr>
<tr>
<td><em>Atriplex</em> spp.</td>
<td>21</td>
</tr>
<tr>
<td><em>hadata</em></td>
<td>61</td>
</tr>
<tr>
<td><em>hortensia</em> (oreche)</td>
<td>41, 42, 158</td>
</tr>
<tr>
<td><em>patula</em></td>
<td>184</td>
</tr>
<tr>
<td><em>Afrobas bilobada</em> (bilobada)</td>
<td>115</td>
</tr>
<tr>
<td><em>Avena sativa</em> (oats)</td>
<td>122, 124, 125, 136, 155</td>
</tr>
<tr>
<td><em>Averrhoa carambola</em> (carambola)</td>
<td>115</td>
</tr>
<tr>
<td><em>Avocado</em> (see <em>Persea gratissima</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Bahama grass</em> (see <em>Cynodon dactylon</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Balsam fìr</em> (see <em>Abies balsamea</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Bambu</em> (see also <em>Arundinaria, Bambusa, Cephalostachyum, Dendrocalamus, Melocoon- na, Phyllostachys</em>)</td>
<td>31-33, 143</td>
</tr>
<tr>
<td><em>Bambusa</em> spp. (bamboo)</td>
<td>31, 32, 33</td>
</tr>
<tr>
<td><em>distorta</em></td>
<td>33</td>
</tr>
<tr>
<td><em>fortunei</em></td>
<td>32</td>
</tr>
<tr>
<td><em>oliveriana</em></td>
<td>33</td>
</tr>
<tr>
<td><em>tessellata</em></td>
<td>32</td>
</tr>
<tr>
<td><em>Bambusa tulda</em></td>
<td></td>
</tr>
<tr>
<td><em>viridis</em></td>
<td></td>
</tr>
<tr>
<td><em>viridi-strata</em></td>
<td>33</td>
</tr>
<tr>
<td><em>vulgaris</em> (leathery bamboo)</td>
<td>33</td>
</tr>
<tr>
<td><em>Banan</em> (see <em>Musa sapientum</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Bayan</em> (see <em>Ficus benghalensis</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Barberry</em> (see <em>Opuntia vulgaris</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Barley</em> (see <em>Hordeum sativum</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Basswood</em> (see <em>Tilia</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>Bauhinia racemosa</em> (mountain ebony)</td>
<td>149</td>
</tr>
<tr>
<td><em>Bay</em> (see <em>Laurus</em> spp.)</td>
<td>21</td>
</tr>
<tr>
<td><em>Beans</em> (see also <em>Phaseolus, Vicia, Glycine</em>)</td>
<td>5, 6, 35-38, 60, 61, 64, 93, 129, 165, 184</td>
</tr>
<tr>
<td><em>Bean</em>, broad (see <em>Vicia faba</em>)</td>
<td>21, 93, 115, 184</td>
</tr>
<tr>
<td><em>caster</em> (see <em>Ricinus</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>French</em> (see <em>Phaseolus vulgaris</em>)</td>
<td>38</td>
</tr>
<tr>
<td><em>haricot</em> (see <em>Phaseolus vulgaris</em>)</td>
<td></td>
</tr>
<tr>
<td><em>jack</em> (see <em>Canavalia</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>kidney</em> (see <em>Phaseolus vulgaris</em>)</td>
<td></td>
</tr>
<tr>
<td><em>lima</em> (see <em>Phaseolus lunatus</em>)</td>
<td>37</td>
</tr>
<tr>
<td><em>Madagascar</em></td>
<td></td>
</tr>
<tr>
<td><em>senna</em> (see <em>Cassia</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>soy</em> (see <em>Glycine hispida</em>)</td>
<td></td>
</tr>
<tr>
<td><em>string</em> (see <em>Phaseolus vulgaris</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Tonga</em></td>
<td>37</td>
</tr>
<tr>
<td><em>Beech</em> (see <em>Fagus</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>Beet</em> (see <em>Beta vulgaris</em>)</td>
<td>38</td>
</tr>
<tr>
<td><em>sugar</em> (see <em>Beta vulgaris crusia</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Berseem</em> (see <em>Trifolium alexandrinum</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Beta vulgaris</em> (beet)</td>
<td>5, 6, 41-44, 129, 137, 197, 214, 219</td>
</tr>
<tr>
<td><em>manget-wurzel</em></td>
<td>41, 42</td>
</tr>
<tr>
<td><em>mangolds</em></td>
<td>41, 42</td>
</tr>
<tr>
<td><em>crausa</em> (sugar beets)</td>
<td>41, 42, 43, 197</td>
</tr>
<tr>
<td><em>cia</em> (Swiss chard)</td>
<td>42</td>
</tr>
<tr>
<td><em>Betal nut</em> (see <em>Arceo catechu</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Betula</em> spp. (bird)</td>
<td>6, 45-47, 107, 108, 138, 150, 151, 152, 177, 221</td>
</tr>
<tr>
<td><em>alba</em></td>
<td>45, 46</td>
</tr>
<tr>
<td><em>odorata</em></td>
<td>45, 46</td>
</tr>
<tr>
<td><em>papyrifera</em></td>
<td>45</td>
</tr>
<tr>
<td><em>pubescens</em></td>
<td>45</td>
</tr>
<tr>
<td><em>verrucosa</em></td>
<td>45</td>
</tr>
<tr>
<td><em>Birch</em> (see <em>Betula</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>Black apple</em> (see <em>Sideroxylon</em> [Achras] austral.)</td>
<td></td>
</tr>
<tr>
<td><em>sorrel</em> (see <em>Rubsus</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>Blackthorn</em></td>
<td>105, 107, 111</td>
</tr>
<tr>
<td><em>Bombax malabaricum</em> (silk cotton)</td>
<td>194</td>
</tr>
<tr>
<td><em>Books</em></td>
<td>15</td>
</tr>
<tr>
<td><em>Box</em> (see <em>Buxus</em> spp.)</td>
<td></td>
</tr>
<tr>
<td><em>Bramble</em></td>
<td>177</td>
</tr>
<tr>
<td><em>Brassica</em> spp.</td>
<td>48-50, 157</td>
</tr>
<tr>
<td><em>arenensis</em> (charlock)</td>
<td>92</td>
</tr>
<tr>
<td><em>campestris</em> (rutabaga)</td>
<td>193, 215</td>
</tr>
<tr>
<td><em>napus</em> (rape)</td>
<td>49, 91, 135, 187, 188, 215</td>
</tr>
<tr>
<td><em>oleracea</em> acephala (collard)</td>
<td>45</td>
</tr>
<tr>
<td><em>kale</em></td>
<td>48, 140, 197</td>
</tr>
<tr>
<td><em>botrys</em> (cauliﬂower)</td>
<td>6, 48, 52</td>
</tr>
<tr>
<td><em>capitata</em> (cabbage)</td>
<td>5, 6, 48, 59, 61, 64, 91, 184</td>
</tr>
<tr>
<td><em>caulo-rapa</em></td>
<td>187, 188, 214, 218, 219</td>
</tr>
<tr>
<td><em>caulo-rapa</em> (kohl-rabi)</td>
<td>140</td>
</tr>
<tr>
<td><em>rapa</em> (turlip)</td>
<td>6, 197, 218, 215</td>
</tr>
<tr>
<td><em>Brazil cherry</em> (see <em>Eugenia braziliensis</em>)</td>
<td></td>
</tr>
<tr>
<td><em>Bromelinae</em></td>
<td>202</td>
</tr>
<tr>
<td><em>Broom corn</em> (Holcus sorghum)</td>
<td></td>
</tr>
<tr>
<td><em>Brussels sprouts</em> (see <em>Brassica oleracea</em>)</td>
<td></td>
</tr>
<tr>
<td>Plant Name</td>
<td>Page</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td>Bryonia dioica (bryony)</td>
<td>92</td>
</tr>
<tr>
<td>Buckeye (see Aesculus spp.)</td>
<td>108</td>
</tr>
<tr>
<td>Buckthorn (see Rhamnus spp.)</td>
<td>110</td>
</tr>
<tr>
<td>Bull-oak (see Castanopsis spp.)</td>
<td>41,115</td>
</tr>
<tr>
<td>Bunch cherry</td>
<td>52, 57, 59, 62, 63, 109</td>
</tr>
<tr>
<td>Bushes</td>
<td>116, 117, 120</td>
</tr>
<tr>
<td>Butternut (see Juglans cinerea)</td>
<td>58, 60, 115</td>
</tr>
<tr>
<td>Buttonwood (see Platania spp.)</td>
<td>115, 116, 152</td>
</tr>
<tr>
<td>Busyspermum parkii</td>
<td>115, 139</td>
</tr>
<tr>
<td>Buxus spp. (box)</td>
<td>161, 201</td>
</tr>
<tr>
<td>Cabbage (see Brassica oleracea capitata)</td>
<td>115, 139</td>
</tr>
<tr>
<td>Cabbyao (see Eugenia malaccensis)</td>
<td>202</td>
</tr>
<tr>
<td>Cacao (see Theobroma cacao)</td>
<td>216</td>
</tr>
<tr>
<td>Cajanus indicus (pigeon pea, tur)</td>
<td>55, 62, 63, 109</td>
</tr>
<tr>
<td>Calamagrostis tenuiflora</td>
<td>108, 116, 139</td>
</tr>
<tr>
<td>Calamus (see Cyperus sp.)</td>
<td>115, 139</td>
</tr>
<tr>
<td>Calopkyllum inophyllum (round kamani)</td>
<td>200, 201</td>
</tr>
<tr>
<td>Calotropis sp.</td>
<td>116, 139</td>
</tr>
<tr>
<td>Camellia thea (see Thea sinensis)</td>
<td>117, 139</td>
</tr>
<tr>
<td>Canavalia spp. (Jack bean)</td>
<td>118, 139</td>
</tr>
<tr>
<td>Camellia indica (tea)</td>
<td>119, 139</td>
</tr>
<tr>
<td>Canes</td>
<td>120, 139</td>
</tr>
<tr>
<td>Sugar (see Saccharum officinarum)</td>
<td>120, 139</td>
</tr>
<tr>
<td>Cannabis sativus (hemp)</td>
<td>120, 139</td>
</tr>
<tr>
<td>Cantelope (see Cucumis melo)</td>
<td>121, 139</td>
</tr>
<tr>
<td>Caoutchouc (see rubber)</td>
<td>121, 139</td>
</tr>
<tr>
<td>Cape weed</td>
<td>121, 139</td>
</tr>
<tr>
<td>Carapariss pandanulosis</td>
<td>121, 139</td>
</tr>
<tr>
<td>Roeburgh</td>
<td>121, 139</td>
</tr>
<tr>
<td>Capicium sp. (papper)</td>
<td>121, 139</td>
</tr>
<tr>
<td>Cardia papaya (papaya, pawpaw)</td>
<td>121, 139</td>
</tr>
<tr>
<td>Carpenteria californica</td>
<td>121, 139</td>
</tr>
<tr>
<td>Catappa indica (Natal plum)</td>
<td>121, 139</td>
</tr>
<tr>
<td>Diffusa</td>
<td>121, 139</td>
</tr>
<tr>
<td>Carpinus betulus</td>
<td>106, 107, 108, 137</td>
</tr>
<tr>
<td>Carrots (see Daucus carota)</td>
<td>115, 137</td>
</tr>
<tr>
<td>Carum petroselinum (parsley)</td>
<td>115, 137</td>
</tr>
<tr>
<td>Caryota urens (wine palm)</td>
<td>121, 137</td>
</tr>
<tr>
<td>Cashew (see Anacardium occidentale)</td>
<td>121, 137</td>
</tr>
<tr>
<td>Cassava (see Manihot utilissima)</td>
<td>121, 137</td>
</tr>
<tr>
<td>Cassia spp. (sema bean)</td>
<td>121, 137</td>
</tr>
<tr>
<td>Auricula</td>
<td>121, 137</td>
</tr>
<tr>
<td>Castanea spp. (chestnut)</td>
<td>35, 53, 54, 105, 137</td>
</tr>
<tr>
<td>Vesca</td>
<td>44, 137</td>
</tr>
<tr>
<td>Vulpnris</td>
<td>54, 137</td>
</tr>
<tr>
<td>Castilllos elastica (Panama rubber)</td>
<td>137</td>
</tr>
<tr>
<td>Castor bean (see Ricinus spp.)</td>
<td>164</td>
</tr>
<tr>
<td>Castanopsis spp. (She-oak)</td>
<td>97</td>
</tr>
<tr>
<td>Catalpa (see Culalpa spp.)</td>
<td>97</td>
</tr>
<tr>
<td>Catalpa spp. (Catalpa)</td>
<td>97</td>
</tr>
<tr>
<td>Caterpillar (see Brassica oleracea botrytis)</td>
<td>97</td>
</tr>
<tr>
<td>Cayenne cherry (see Eugenia uniflora)</td>
<td>97</td>
</tr>
<tr>
<td>Ceara rubber (see Manihot glaziovii)</td>
<td>97</td>
</tr>
<tr>
<td>Cedar (see Cedrus spp., Chamaecyparis spp.)</td>
<td>97</td>
</tr>
<tr>
<td>Red (see Juniperus spp.)</td>
<td>97</td>
</tr>
<tr>
<td>White (see Cedrus spp.)</td>
<td>97</td>
</tr>
<tr>
<td>Cedrela toona</td>
<td>97</td>
</tr>
<tr>
<td>Cedrus spp</td>
<td>97</td>
</tr>
<tr>
<td>Sp. (white cedar)</td>
<td>97</td>
</tr>
<tr>
<td>Deodara</td>
<td>97</td>
</tr>
<tr>
<td>Cebia spp. (silk cotton)</td>
<td>97</td>
</tr>
<tr>
<td>Bomfazi (kapok)</td>
<td>97</td>
</tr>
<tr>
<td>Celery (see Apium graveolens)</td>
<td>97</td>
</tr>
<tr>
<td>Cephalostachyum pergracile (bamboo)</td>
<td>97</td>
</tr>
<tr>
<td>Cestrum sp. (Chinese inkberry)</td>
<td>115</td>
</tr>
<tr>
<td>Nocturnum (night-blooming jessamine)</td>
<td>115</td>
</tr>
<tr>
<td>Chamaecyparis spp. (cedar)</td>
<td>115</td>
</tr>
<tr>
<td>Nutkaensis</td>
<td>115</td>
</tr>
<tr>
<td>Obitus</td>
<td>115</td>
</tr>
<tr>
<td>Piafera</td>
<td>115</td>
</tr>
<tr>
<td>Chard (see Beta vulgaris cicla)</td>
<td>115</td>
</tr>
<tr>
<td>Swiss (see Beta vulgaris cicla)</td>
<td>115</td>
</tr>
<tr>
<td>Charlock (see Brassica arvensis)</td>
<td>115</td>
</tr>
<tr>
<td>Cheese wood (see Acronychia lasiica)</td>
<td>115</td>
</tr>
<tr>
<td>Chenopodium spp. (goosefoot)</td>
<td>115</td>
</tr>
<tr>
<td>Chertymoya (see Annona cherimoya)</td>
<td>115</td>
</tr>
<tr>
<td>Cherry (see Prunus spp.)</td>
<td>115</td>
</tr>
<tr>
<td>Jerusalem (see Solanum capsicastrum)</td>
<td>115</td>
</tr>
<tr>
<td>Sour (see Prunus cerasus)</td>
<td>115</td>
</tr>
<tr>
<td>Surinam (see Eugenia uniflora)</td>
<td>115</td>
</tr>
<tr>
<td>Chestnut (see Castanea spp.)</td>
<td>115</td>
</tr>
<tr>
<td>Chicory (see Cichorium intybus)</td>
<td>115</td>
</tr>
<tr>
<td>China berry (see Metla azedarach)</td>
<td>115</td>
</tr>
<tr>
<td>Chinese inkberry (see Cestrum sp.)</td>
<td>115</td>
</tr>
<tr>
<td>Orange (see Citrus japonica)</td>
<td>115</td>
</tr>
<tr>
<td>Plum (see Norkhonia emarginata)</td>
<td>115</td>
</tr>
<tr>
<td>Chocolate (see Theobroma spp.)</td>
<td>115</td>
</tr>
<tr>
<td>Chrysanthemum spp</td>
<td>115</td>
</tr>
<tr>
<td>Chrysobalanus spp</td>
<td>115</td>
</tr>
<tr>
<td>Ellipticus</td>
<td>115</td>
</tr>
<tr>
<td>Iaco (Cocos plum, jieaco)</td>
<td>115</td>
</tr>
<tr>
<td>Decumana (see Citrus grandis)</td>
<td>115</td>
</tr>
<tr>
<td>Grandis (grapefruit)</td>
<td>115</td>
</tr>
<tr>
<td>Pomelo</td>
<td>115</td>
</tr>
<tr>
<td>Shaddock</td>
<td>115</td>
</tr>
<tr>
<td>Japanese (kumquat)</td>
<td>115</td>
</tr>
<tr>
<td>Aurantiol (lime)</td>
<td>115</td>
</tr>
<tr>
<td>Lemon</td>
<td>115</td>
</tr>
<tr>
<td>Medica acidula</td>
<td>115</td>
</tr>
<tr>
<td>Nobilis deliciouia (mandarin orange)</td>
<td>115</td>
</tr>
<tr>
<td>Tangerina</td>
<td>115</td>
</tr>
<tr>
<td>Trifolium (see Pimpinella)</td>
<td>115</td>
</tr>
<tr>
<td>Clover (see Trifolium spp.)</td>
<td>115</td>
</tr>
<tr>
<td>Egyptian (see Trifolium aestivum)</td>
<td>115</td>
</tr>
<tr>
<td>Cobnut (see Corylus spp.)</td>
<td>115</td>
</tr>
<tr>
<td>Cobs</td>
<td>115</td>
</tr>
<tr>
<td>Cocomola unifera (sea-grape)</td>
<td>115</td>
</tr>
<tr>
<td>Cocoa plum (see Chrysobalanus icaco)</td>
<td>115</td>
</tr>
<tr>
<td>Coconut palm (see Coccos nucifera)</td>
<td>115</td>
</tr>
<tr>
<td>Cocos nucifera (coconut palm)</td>
<td>115</td>
</tr>
<tr>
<td>Coffee</td>
<td>115</td>
</tr>
<tr>
<td>Arabica (Arabian coffee)</td>
<td>115</td>
</tr>
<tr>
<td>Hibrica (Liberian coffee)</td>
<td>115</td>
</tr>
</tbody>
</table>
Plant Index.

Page.

Coffee robusta ........................................ 62
Coffea robusta ........................................ 64
Coffee (see Cofiea spp.)
Cola (see Sterculia acuminata)
Collard (see Brassica oleracea acephala)
Conifers .................................................. 6, 61-84, 117, 210
Convallaria majalis (Lily-of-the-Valley) .............. 28
Corylus sanguinea .................................... 123
Copa (see Zea mayes)
Crown (see Holcus sorghum)
Guinea (see Holcus sorghum)
Indian (see Zea mayes)
Kauri (see Holcus sorghum)
Cornus spp. (dogwoods) .................................. 95
Sanguinea .................................................. 95
Scriba .......................................................... 95
Corylus flherts ........................................... 108, 133
(hazelnuit). 38, 107, 108, 133-135, 151, 175
Avellana .................................................. 45, 133, 134
Columba .................................................... 134
Tubulosa .................................................... 133
Cosmos spp. ............................................... 215
Cowpeas (see Vigna unguiculata)
Cotton (see Gossypium spp.)
Silk (see Bombax malabaricum)
(Ceiba spp.)
Cottonwood (see Populus spp.)
Crataegus spp. (see Mesplia spp.)
Crataecae .................................................. 37, 165
Crucifers .................................................. 6, 91, 92, 188, 218, 219
Cucumber (see Cucumis sativus)
Cucumis spp. (melons) .................................. 5, 92, 93
(Sweet melons) .......................................... 92
Melo (cantaloupe, muskmelon) ................... 51, 150
Sativus (cucumber) .................................... 42, 92, 114
(Gherkins) .................................................. 90, 129
Cucurbita sp. (gourds) .................................. 92, 122
Maxima (squash) ......................................... 93
Pepo (pumpkin) ........................................... 92
Oiveira (marrow) ......................................... 92
Cucurbitaeae .............................................. 92, 93, 117, 183, 220
Cupressus spp. (cypress) ............................... 94
Funebris .................................................... 94
Glaucac ....................................................... 94
Lambertiana .............................................. 64, 94
Macrocarya (Monterey cypress) .................... 91
Pyramidalis .............................................. 91
Scopetriches ............................................. 94
Curtain (see Ribes spp.)
Custard apple (see Annona spp.)
Cyclus revoluta (sago palm) ......................... 5, 150, 152, 190, 201
Cydonia japonica ....................................... 186
Oblonga (quince) ....................................... 17, 19, 114, 115, 186, 157
Cydonia decipiens (Bermuda grass) .................. 200
Cypris (see Chamaecyparis spp., Cupressus spp.)
Lambert's (see Cupressus lambertiana).
Cylinus laburnum ....................................... 36
Daffodil (see Narcissus spp.)
Dahlia spp ............................................... 82, 215
Dahlia odora (sissu) ................................... 195
Dammera spp. (see Agathis australis)
Dandelion (see Taraxacum officinale)
Date (see Phoexis dactylifera)
Daucus carota (carrot) ................................. 51, 214, 215

Page.

Dendrocolumus giganteus (bamboo) .................. 33
Hamitology ................................................ 33
strictus ..................................................... 31, 33
Despar (see Cedrus deodara)
Diospyros spp. (persimmon) ............................ 170
Ebenum ..................................................... 170
Kan (Japanese persimmon). . . . . . . . . . . . . . . . . . . . . . . . . 113, 115, 170
Dodonae viscosa .......................................... 211
Dogwood (see Cornus spp.)
Dolichos spp. ............................................. 36
Drugs .......................................................... 84
Dry food products ....................................... 84
Duyanana spp. ............................................ 62
Dura (see Holcus sorghum)
Ebony, mountain (see Bauhinia racemosa).
Eggplant (see Solanum melongena)
Elengi tree (see Musium eleusin).
Elm (see Ulmus spp.)
Cork (see Ulmus sp.)
Emmer (see Triticum spp.)
Epilobium sp. ............................................. 127
Eriobotrya japonica (loquat). ...................... 85, 112, 114, 115, 142
Erythrina lysiphius (coral tree) .................... 62
Eucalyptus spp. .......................................... 13, 20, 97-100
Amygdalina (peppermint gum) .................... 98
capitilata ................................................. 99
corymbosa (bloodwood) ............................ 99
diversicolor (karril) .................................. 99
dumosa ...................................................... 98
globulus (blue gum) ................................... 98, 99
gracilis .................................................. 99
hassautoma .............................................. 98, 99
increassata ............................................... 99
leucozylium .............................................. 99
mellitiodora (honey-scented gum) ............ 98, 99
ministia .................................................. 98
oleosa ..................................................... 98
patens ..................................................... 98
piperita (peppermint stringy-bark) ............ 99
polyanthemos ........................................... 99
resinifera ............................................... 99
rubusta (swap mahogany) ......................... 99
rostra (red gum) ....................................... 98, 99
siderophöia (broad-leaved iron-bark) ............ 99
sideriania ................................................. 99
stuartiana (applescented gum) ........... 97, 98
tessellaris ................................................. 99
uncia (manna gum) .................................... 97, 98, 99
Eugenia spp ............................................ 100, 113
Braziliens (rose-apple) .................. 100, 115
Malocomensis (Cabuyao, Malay apple, mountain apple) ........................................... 57, 100, 115, 117
unifloria (Surinam cherry) ......................... 100, 115, 116
Euorlops sp. ............................................... 42
Evergreen trees (see also Conifers) ............. 131
Eucalyphus europaeus (spindle tree) ............. 108, 138
Exerement, human ...................................... 157
Pugus spp. (beech) ..................................... 6, 38-40, 46, 65, 107, 108, 135, 150, 151, 189, 221
Cliffortioides ........................................... 39
fusca ......................................................... 39
FLAX

Ficus spp. (fig, rubber) 100-103,172,192

Filbert

Forests

Filberts

Fig

Gossypium spp. (cotton) 59,62,81,86-91,191

Page

251

Page

251
**PLANT INDEX.**

<table>
<thead>
<tr>
<th>Page</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>139</td>
<td><em>Junciperus excelsa</em></td>
</tr>
<tr>
<td>139</td>
<td><em>fetidissima</em></td>
</tr>
<tr>
<td>139</td>
<td><em>macrocarpa</em></td>
</tr>
<tr>
<td>139</td>
<td><em>arceodrus</em></td>
</tr>
<tr>
<td>139</td>
<td><em>phencica</em></td>
</tr>
<tr>
<td>139</td>
<td><em>recra</em></td>
</tr>
<tr>
<td>139</td>
<td><em>sabina</em></td>
</tr>
<tr>
<td>139</td>
<td><em>spharica</em></td>
</tr>
<tr>
<td>139</td>
<td><em>torulosa</em></td>
</tr>
<tr>
<td>139</td>
<td><em>virginiana</em></td>
</tr>
<tr>
<td>139</td>
<td><em>Kaffir</em> (see <em>Holcus soraphum</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kaffir</em> plum (see <em>Herpephyllum cafrum</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kale</em> (see <em>Brassica oleracea acephala</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kamani, round</em> (see *Celophyllum inophyl-</td>
</tr>
<tr>
<td>140</td>
<td><em>winged</em> (see <em>Terminalia catappa</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kauri</em> (see <em>Agathis australis</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kel, apple</em> (see <em>Aberia caffra</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kielia spp.</em> (see <em>Funtumia spp.</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kohi-rabi</em> (see <em>Brassica oleracea caulorapa</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kola</em> (see <em>Sterculia acuminata</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kumquat</em> (see <em>Citrus japonica</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Kurrimia zeplana</em></td>
</tr>
<tr>
<td>140</td>
<td><em>Lactuca spp. (lettuce)</em></td>
</tr>
<tr>
<td>140</td>
<td><em>Lambquarters</em> (see <em>Chenopodium or Attriplax</em>)</td>
</tr>
<tr>
<td>141</td>
<td><em>Larch</em> (see <em>Larix spp.</em>)</td>
</tr>
<tr>
<td>141</td>
<td><em>Larix spp. (Larch)</em></td>
</tr>
<tr>
<td>142</td>
<td><em>64, 65, 66, 67, 68, 69, 70, 83, 84, 108, 140</em></td>
</tr>
<tr>
<td>142</td>
<td><em>decidua</em> (europaea)*</td>
</tr>
<tr>
<td>143</td>
<td><em>europa</em> (see <em>Larix decidua</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>Lathyrus spp.</em></td>
</tr>
<tr>
<td>139</td>
<td><em>Laurus spp. (bay)</em></td>
</tr>
<tr>
<td>139</td>
<td><em>campphora</em> (camphor)</td>
</tr>
<tr>
<td>139</td>
<td><em>canariensis</em></td>
</tr>
<tr>
<td>139</td>
<td><em>drynifoia</em> (see <em>Persea persica</em>)</td>
</tr>
<tr>
<td>139</td>
<td><em>indicus</em></td>
</tr>
<tr>
<td>139</td>
<td><em>nobilis</em> (sweet bay)</td>
</tr>
<tr>
<td>139</td>
<td><em>Leather</em></td>
</tr>
<tr>
<td>14</td>
<td><em>Leek</em> (see <em>Allium porrum</em>)</td>
</tr>
<tr>
<td>145</td>
<td><em>Legumes</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Lemma spp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Lemon</em> (see <em>Citrus limonia</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lena esculenta</em> (lentil)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lentil</em> (see <em>Lena esculenta</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Leptospermum spp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Leucothoe</em> (see <em>Lactuca spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Ligusticum spp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Ligustrum vulgare</em> (privet)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lilies</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Lily of the Valley</em> (see <em>Convallaria majalis</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Limo</em> (see <em>Citrus aurantium</em>; <em>Tilia spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>sweet</em> (see <em>Citrus aurantium</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Linden</em> (see <em>Tilia spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Linnam spp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>usitatisimum</em> (flax)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lippia citriadora</em> (lemon verbena)</td>
</tr>
<tr>
<td>151</td>
<td><em>Livistona humulis</em> (palm)</td>
</tr>
<tr>
<td>151</td>
<td><em>Loganberry</em> (see <em>Rubus spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lonciera spp. (honesuckle)</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Loquats</em> (see <em>Eriobotrya japonica</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lotus spp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Lucerne</em> (see <em>Medicago sativa</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Lycoeresium evelentum</em> (tomato)</td>
</tr>
<tr>
<td>151</td>
<td><em>Madagascar beans</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Mahogany</em> (see <em>Sietienia mahogani</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Maltaeuxa sp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Mella azedarach</em> (Chinaberry)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mellitou sfricaius</em> (milletus)</td>
</tr>
<tr>
<td>151</td>
<td><em>Melocanna bambusoides</em> (bamboo)</td>
</tr>
<tr>
<td>151</td>
<td><em>Melons</em> (see <em>Cucumis spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mesphis spp.</em> (hawthorn)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mexican almond</em> (see <em>Terminalia catappa</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>umbrella tree</em> (see <em>Terminalia catappa</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Millet</em> (see <em>Panicum miliaceum</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mimusops elengi</em> (elengi)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mock orange</em> (see <em>Murraya croatica</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Morus sp. (mulberry)</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Moth</em> (see <em>Phaseolus aconitifolius</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mountain apple</em> (see <em>Eugenia malaccensis</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>ash</em> (see <em>Sorbus spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>ebony</em> (see <em>Bauhinia racemosa</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mulberry</em> (see <em>Morus spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mung</em> (see <em>Phaseolus mung</em>).</td>
</tr>
<tr>
<td>151</td>
<td><em>Murraya croatica</em> (mock orange)</td>
</tr>
<tr>
<td>151</td>
<td><em>Musa sp. (banana, plantain)</em></td>
</tr>
<tr>
<td>151</td>
<td><em>paradisiaca</em></td>
</tr>
<tr>
<td>151</td>
<td><em>sapientium</em> (banana)</td>
</tr>
<tr>
<td>151</td>
<td><em>33, 34, 55, 109, 114, 118, 201, 202, 204</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Musk melon</em> (see <em>Cucumis melo</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Mustard</em> (see <em>Sinapis spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Myriarrhia</em> (see jabotiena)</td>
</tr>
<tr>
<td>151</td>
<td><em>Myristus</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Narcissus spp.</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Naturtium</em> (see <em>Tropoccus spp.</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Natal plum</em> (see <em>Carissa arundina</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Nectarine</em> (see <em>Amygdalis persica nuxpersica</em>)</td>
</tr>
<tr>
<td>151</td>
<td><em>Nepetalum lappaceum</em></td>
</tr>
<tr>
<td>151</td>
<td><em>Nicotiana tabacum</em> (tobacco)</td>
</tr>
<tr>
<td>151</td>
<td><em>59, 95, 198, 207, 213-216, 21</em></td>
</tr>
</tbody>
</table>
Parsley

Pavonia

Persea

Peganum

Platanus

Poa

Picea

Phyllodoce

Phyllostachys

Phylocalyx

Pinus

Pineapple

Pinus

Pistacia
PLANT INDEX.

Page.  
Pistacia terebinthus... 171  
vera (pistachio) ... 171  
Pinus sylvestris (pea) ... 5, 6, 36, 37, 60, 164, 165, 196, 197, 214, 215  
Plane tree (see *Platanus* spp.) ... 181  
Plantago lanceolata ... 181  
Plantain (see *Musa* spp.; *Plantago* spp.) ... 171  
Platanus spp. (buttonwood, sycamore) ... 171  
orientalis (oriental plane) ... 171  
Plum (see *Prunus* spp.) ... 181  
Kafir (see *Heteropappus arduina*) ... 113  
Para (see *Stipandina* spp.) ... 113  
Polygonum spp. ... 113  
Pomegranate (see *Punica granatum*) ... 113  
Pomelo (see *Citrus grandis*) ... 113  
Punica trifolia (trifoliate orange) ... 59  
Poplar (see *Populus* spp.) ... 113  
Populus spp. (poplar) ... 12, 106, 107, 108, 138, 180-183, 221  
*alba* (white poplar) ... 181, 182, 221, 222  
balsamifera (balsam poplar) ... 181  
canadensis ... 180  
ciliata ... 181  
dilatata ... 181  
cuspidate ... 180, 181  
laurifolia ... 181, 221  
monilifera ... 181  
nigra (black poplar) ... 180, 181  
tremula (aspen) ... 29, 130, 180, 181  
virginiana ... 181  
*Portulaca oleracea* (purslane) ... 12, 181  
Potato (see *Solanum tuberosum*) ... 12  
sweet (see *Ipomoea batatas*) ... 12  
Prickly pear (see *Opuntia* spp.) ... 12  
Privet (see *Ligustrum vulgare*) ... 12  
Prospis spp. (mesquite, *algaroba*) ... 148  
*spicigera* ... 148  
Prune (see *Prunus* spp.) ... 148  
*Prunus* spp. (cherry) ... 17, 20, 21, 53, 109, 113, 129, 169, 172, 173, 174, 175, 177, 179, 180  
(plum) ... 5, 17, 20, 21, 50, 105, 109, 111, 114, 166, 169, 172, 173, 174, 175, 176, 177, 178, 179, 190  
(pruine) ... 172, 173  
(sloe) ... 17, 175  
*armeniaca* (apricot) ... 5, 21, 24, 25, 114, 115, 166, 167, 172, 176, 179  
avium (sweet cherry) ... 178  
cerasus (sour cherry) ... 115, 178, 179, 180  
*chameecerasus* (ground cherry) ... 172  
domestica (plum) ... 43, 172, 178, 179  
insititia (damson plum) ... 172, 178  
larocerasus (cherry laurel) ... 178  
padus (European bird cherry) ... 172, 178  
pseudocerasus ... 178  
salicia (Japanese plum) ... 113, 180  
spinae (blackthorn) ... 172, 178, 179  
*Pseudotsuga* spp. (Douglas fir) ... 64  
microcarpa ... 69  
taxifolia (Douglas fir) ... 61, 65  
*Psidium* spp. (guava) ... 85, 109, 112, 113, 114, 116, 117, 118, 131, 132, 200  
Page.  
*Psidium cattleianum* (strawberry guava) ... 115, 132  
guajava (guava) ... 109, 113, 115, 131, 132  
pomiferum ... 131  
Pumpkin (see *Cucurbita pepo*) ... 112, 180  
*Punica granatum* (pomegranate) ... 112, 180  
Purslane (see *Portulaca oleracea*) ... 186  
*Pyrus communis* (pear) ... 5, 7, 17, 18, 19, 21, 105, 111, 113, 129, 127, 160, 174, 177  
(cork oak) ... 151  
brandtii ... 151  
castaneifolia ... 153  
cerisii ... 152, 153  
esoeifera ... 152, 153  
dilatata ... 153, 154  
griffithii ... 153  
itex (holly oak) ... 152, 153  
itex baillota ... 153  
incana ... 153, 154  
lamellosa ... 154  
*lusitanica* ... 152  
macedonica ... 152, 153  
montana (chestnut oak) ... 152  
nigra ... 152  
potauis ... 152, 153  
pedunculata ... 152, 153  
*prinus* ... 153  
pubescens ... 152  
robur (English oak) ... 152, 153, 154  
semicarpifolia ... 153  
sensiflora ... 137, 152, 153  
suber (cork oak) ... 152, 153  
toa ... 153  
Quince (see *Cydonia oblonga*) ... 137, 153  
Quinine (see *Cinchona* spp.) ... 137, 153  
Radula armoracia (horseradish) ... 91, 188  
Radish (see *Raphanus sativus*) ... 187  
Rape (see *Brassica napus*) ... 187  
*Raphanus raphanistrum* (white charlock) ... 187  
sativus (radish) ... 19, 187, 188  
Raspberry (see *Rubus* spp.) ... 187  
Rattan (see *Canna* spp.) ... 187  
Redeye spp. ... 91  
*Rhamnus* spp. (buckthorn) ... 48, 107, 108, 138  
*alaternus* ... 48  
frangula ... 48  
*Rhus* (see *Rhus rhamniformis*) ... 91, 189  
Rhododendron spp. ... 129  
*Rhus* (see *Rhus rhamniformis*) ... 129  
Ribes spp. ... 118-121  
currant) ... 93, 118, 119, 120, 121  
*gooseberry* ... 93, 118, 119, 120  
(red currant) ... 121  
alpinum (Alpine currant) ... 118  
nigrum (black currant, var. Baldwin) ... 118  
Blaek eck (Dutch) ... 118  
Black Na- ples) ... 118  
Lee's Pro-life) ... 118  
rubrum (red currant) ... 121  
sanguineum ... 121
PLANT INDEX

Rice (see Oryza sativa) .................................. 159
Kicinuz spp. (castor bean) ............................... 85
Koripa nasturtium (watercress) ....................... 220
Rossa spp. (roose) ....................................... 5, 106, 107, 109, 113, 121, 127, 128, 159, 169, 191, 192, 200
(tea rose). .................................................. 131, 192
arvensis ................................................... 191
canina (dog rose) ........................................ 191
tavigata (Cherokee rose) .............................. 192
Rosa (see Rose spp.). .....................................
apple (see Eugenia jambos) .......................... 211
Rothra tertiaira .............................................
Rowan tree (see Sorbus spp.). .........................
Rubber ..................................................... 192
Assam (see Ficus elastica). ............................
Ceara (see Manihot glaziovii). ........................
India (see Ficus elastica). ............................
Panama (see Castilla elastica). ........................
Para rubber (see Hevea brasiliensis). ............... ...........................
Rhus spp. ................................................ 47, 121
(blackberry) .............................................. 158
(loganberry) ............................................. 47
(raspberry) ............................................... 47, 61, 188, 197
Rumex spp. (sorrel) ..................................... 52, 135
Raphaena (see Brassica campestris). .................
Rye (see Secale cereale). ..............................
Saccharum officinarum (sugar cane) ................. 5, 6, 31, 123, 161, 189, 191, 197-208
Sago palm (saw Ceyls revoluta) ...................... 66
Salindom (see Ondrobyssia sativa) .................. 56
Sal (see Shorea spp.). .................................
Salvia reteculata ........................................ 56
Satis spp. (sawol) ........................................ 111
(willow) ................................................... 6, 12, 107, 109, 111, 128, 135, 151, 180, 221-223
alfa (white willow) .................................... 222, 223
bajongica ................................................ 222
caprea (goat willow) .................................... 222, 223
ciegens ................................................... 222
fragili (brittle willow) .................................. 222, 223
purpurea (purple osier) ............................... 221, 222, 223
trian à l' (osier willow) ............................... 221, 222
viridis .................................................... 222
Sallow (see Salix spp.). ...............................
Salvour spp .............................................. 41
Sang hemp (see Crotalaria) ............................
Sapodilla (see Sideroxyd (Achras) sapota). .......
Sarcocpassus euculentus .............................. 116
Santatum album (sandalwood) ......................... 62
Schinus depenens ........................................ 56
molle (California pepper tree) ....................... 56
Schizomeria ovata (white ash) ........................
Secale cereale (rye) .................................. 128, 123, 124, 125, 126, 187, 193
Sedezes ................................................... 203
Senna bean .............................................. 85
Sor: Ice berry (see A melanchor sp.). .................
Samia sp .................................................. 92
Saripia sp ................................................ 157
Shaddock (see Citrus grandis). ........................
Shalot (see Allium spp.). .............................
She-oak (see Casuarina spp.). ........................
Shorea spp .............................................. 193, 194
robusta .................................................... 105, 194
Shorea tataura .......................................... 193, 194
Shrub ..................................................... 105, 131, 172, 211
Sideroxylion (Achras) australis (black apple) .... 114, 118
sopota (sapodilla) ...................................... 114, 115, 194
Silk cotton (see Bombax malabaricum: Coba) ....
rubber (see Funtumia elastica). ......................
Silky oak (see Grevillea robusta). ....................
Sinapis spp. (mustard) ................................ 92
Sisoo (see Dolerina sissoo). ........................... 92
Sloe (see Prunus spp.). ................................
Solanaceae .............................................. 56, 92, 183, 217
Solanum spp ............................................. 159
capsicium (Jerusalem cherry) ....................... 115
melongena (eggplant) ............................... 86, 95, 122, 216, 217
toburum (potato) ..................................... 5, 61, 135, 183-185, 214, 217
Solidago spp. (goldened)&. .......................... 104
Sorbus spp. (mountain ash) .......................... 20, 108, 138, 149, 177
Sorghum (see Holcus sorghum). ......................
Sorrel (see Rumex spp.). ............................
Sour cherry (see Prunus cerasus). ....................
Sour sap (see Ammon spp.). ........................
Soy bean (see Glycine hispida). ......................
Spart (see Trificum sativum). ........................
Spinach (see Spinacia oleracea). ....................
Spinacia oleracea (spinach) ............................ 5, 42, 196
Spindle tree (see Eumonys europeus). ..............
Spondias spp. (Para plum) ............................ 113, 164
sp. (jobo amarillo) ................................... 113
mangifera (jobo de la India) ........................ 113
Spruce (see Picea spp.). ..............................
Douglas (see Pseudotsuga taxifolia). .................
hemlock (see Tsuga spp.). ...........................
Siberian (see Picea spp.). ...........................
white (see Picea alba). .............................
Squash (see Cucurbita maxima). .....................
Star apple (see Cnunopyllum cainito). ..............
Sterculia acuminata (kola) .......................... 109, 140
Straw ..................................................... 126
Strawberry (see Fragaria spp.). ........................
Succory (see Cichorium intybus). ....................
Sugar beet (see Beta vulgaris crassa). ...............
Sugar cane (see Sthouse officinarum). .............
Sunflower (see Helianthus spp.). ....................
Surinam cherry (see Eugenia unijova). ..............
Sweet potato (see Ipoma batatas). ...................
Sweitenia mahagoni (mahogany) .................... 62, 142
Sycamore (see Platanus spp.). ....................... 27
Syringa spp .............................................
Tamarack (see Courniers). ...........................
Tamarind (see Tamarindus indica). .................
Tamarindus indica (tamarind). ...................... 210
Tamarisk (see Tamaris spp.). .......................
Tamarix spp. (tamarisk) ............................. 211
gallina ................................................... 211
manifera ............................................... 211
Tangerine (see Citrus nobilis delicious). ...........
Taphoca (see Manihot utilisinsae). ................
Taraxacum officinarum (dandelion) ................. 135, 215
Tarus spp. (yew) ...................................... 223
Tea (see Thea sinensis). .............................
rose (see Rosa spp.). ................................
Teak (see Tectona grandis). ........................ 212
Tectona grandis (teak) ............................... 212
<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminalia spp.</td>
<td>218</td>
</tr>
<tr>
<td>bellerica</td>
<td>218</td>
</tr>
<tr>
<td>catappa (winged kamani, tropical almond)</td>
<td>109, 115, 218</td>
</tr>
<tr>
<td>chebula</td>
<td>115, 218</td>
</tr>
<tr>
<td>tomentosa</td>
<td>218</td>
</tr>
<tr>
<td>Thea sinesis (tea)</td>
<td>59, 62, 162, 211, 212</td>
</tr>
<tr>
<td>Theobroma spp</td>
<td>50, 55</td>
</tr>
<tr>
<td>cacao (cacao)</td>
<td>50, 62, 85, 109, 115, 116, 195, 211</td>
</tr>
<tr>
<td>Thevetia neriifolia</td>
<td>115</td>
</tr>
<tr>
<td>Thistle</td>
<td>41</td>
</tr>
<tr>
<td>Thorns</td>
<td>169</td>
</tr>
<tr>
<td>Thuya spp. (arborvitae)</td>
<td>25</td>
</tr>
<tr>
<td>africana</td>
<td>25</td>
</tr>
<tr>
<td>ftccidentalis</td>
<td>25</td>
</tr>
<tr>
<td>cordata (small-leaved linden)</td>
<td>141</td>
</tr>
<tr>
<td>europaea</td>
<td>141</td>
</tr>
<tr>
<td>grandiflora</td>
<td>141</td>
</tr>
<tr>
<td>parvifolia</td>
<td>14, 141</td>
</tr>
<tr>
<td>Timber</td>
<td>15, 193, 213</td>
</tr>
<tr>
<td>Timothy (see Phleum pratense).</td>
<td></td>
</tr>
<tr>
<td>Tobacco (see Nicotiana tabacum).</td>
<td></td>
</tr>
<tr>
<td>Tomato (see Lycopersicum esculentum).</td>
<td></td>
</tr>
<tr>
<td>Tonga beans</td>
<td>37</td>
</tr>
<tr>
<td>Toon (see Cedrela toona).</td>
<td></td>
</tr>
<tr>
<td>Trifolium spp. (clover)</td>
<td>6, 60, 61, 184, 214, 220</td>
</tr>
<tr>
<td>alexandrinum (Egyptian clover, berseem)</td>
<td>44</td>
</tr>
<tr>
<td>pratense</td>
<td>165</td>
</tr>
<tr>
<td>Triticum spp. (emmer)</td>
<td>122, 220</td>
</tr>
<tr>
<td>repens</td>
<td>124</td>
</tr>
<tr>
<td>sativum (spelt)</td>
<td>122, 124, 220</td>
</tr>
<tr>
<td>sativum (wheat)</td>
<td>5, 122, 123, 124, 125, 126, 187, 220</td>
</tr>
<tr>
<td>Tropaeolum spp. (nasturtium)</td>
<td>215</td>
</tr>
<tr>
<td>Tropical almond (see Terminalia catappa).</td>
<td></td>
</tr>
<tr>
<td>Toga spp. (hemlock)</td>
<td>64, 135</td>
</tr>
<tr>
<td>Tulipa spp. (tulip)</td>
<td>183</td>
</tr>
<tr>
<td>Tuna (see Opuntia spp.)</td>
<td>185</td>
</tr>
<tr>
<td>Tur (see Cybanus indicus).</td>
<td>37</td>
</tr>
<tr>
<td>Turnip (see Brassica rapa).</td>
<td></td>
</tr>
<tr>
<td>sp. (cork elm)</td>
<td>96</td>
</tr>
<tr>
<td>campestris (English elm)</td>
<td>95, 96</td>
</tr>
<tr>
<td>montana</td>
<td>96</td>
</tr>
<tr>
<td>Umbrella tree (see Melia azedarach).</td>
<td></td>
</tr>
<tr>
<td>Mexican (see Terminalia catappa).</td>
<td></td>
</tr>
<tr>
<td>Vaccinium spp. (whortleberry)</td>
<td>20</td>
</tr>
<tr>
<td>Vachellia farnesiana (see Acacia farnesiana).</td>
<td></td>
</tr>
<tr>
<td>Viburnum spp.</td>
<td>5, 219</td>
</tr>
<tr>
<td>Viburnum tinus</td>
<td>219</td>
</tr>
<tr>
<td>Vicia spp.</td>
<td>36</td>
</tr>
<tr>
<td>faba (broad bean)</td>
<td>35, 36</td>
</tr>
<tr>
<td>sepium</td>
<td>36</td>
</tr>
<tr>
<td>Vigna unguiculata (cowpeas)</td>
<td>36, 37, 38, 91</td>
</tr>
<tr>
<td>Vines (see Vitis spp.).</td>
<td></td>
</tr>
<tr>
<td>Vitis spp. (grape, vine)</td>
<td>5, 6, 15, 24, 109, 127-131, 150, 191</td>
</tr>
<tr>
<td>aestivalis (bunch grape)</td>
<td>127</td>
</tr>
<tr>
<td>arizonica (cadon grape)</td>
<td>127</td>
</tr>
<tr>
<td>carinthiaca</td>
<td>127</td>
</tr>
<tr>
<td>sesuviana</td>
<td>127</td>
</tr>
<tr>
<td>vinifera (grape)</td>
<td>115, 127, 130, 131</td>
</tr>
<tr>
<td>Walnut (see Juglans spp.).</td>
<td></td>
</tr>
<tr>
<td>Watercress (see Roripa nasturtium).</td>
<td></td>
</tr>
<tr>
<td>Watermelon (see Citrullus vulgaris).</td>
<td></td>
</tr>
<tr>
<td>Wattle, black (see Acacia mulliensis).</td>
<td></td>
</tr>
<tr>
<td>Wheat (see Triticum sativum).</td>
<td></td>
</tr>
<tr>
<td>White ash (see Schizomeria ovata).</td>
<td></td>
</tr>
<tr>
<td>Whitethorn (see Mespilus spp.).</td>
<td></td>
</tr>
<tr>
<td>Whortleberry (Vaccinium spp.)</td>
<td>20</td>
</tr>
<tr>
<td>Wild fruits</td>
<td>112, 116</td>
</tr>
<tr>
<td>Willow (see Salix spp.)</td>
<td></td>
</tr>
<tr>
<td>Yams</td>
<td>122</td>
</tr>
<tr>
<td>Yew (see Taxus spp.).</td>
<td></td>
</tr>
<tr>
<td>Zea mays (corn, maize)</td>
<td>6, 54, 85, 122, 123, 135, 142, 189, 197, 200, 203, 208, 214</td>
</tr>
</tbody>
</table>