

Insects Associated with Orchids

By O. H. SWEZEY

Consulting Entomologist
Experiment Station, H.S.P.A., Honolulu

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INTRODUCTION

IN the state of nature, most plants are found to have certain species of insects feeding upon them, which feed exclusively upon each particular kind of plant and never on any other plant. These insects are said to be *attached* to their respective food plants. Thus, among well-known garden plants the cabbage has certain insects attached to it; beans have certain other particular insects attached to them; beets, onions, potatoes, corn, cane, etc. each has its own attached insects. Ornamental plants similarly have their natural insect associates, and the orchids are no exception. Scores of insects are known, attached to orchids in their natural habitats and, no doubt, with further study in these habitats, the number will be greatly increased.

When plants are transported from one region to another, there is likelihood of some of their attached insects being carried with them. There are many noted examples of the disastrous results which followed the accidental introduction of insect pests to new regions by being carried along with their natural host plants. During the past 40-50 years, every known method has been resorted to in an endeavor to prevent the introduction of insects with new plants that are introduced from one country to another. Notwithstanding, and in spite of, the precautions taken when orchids have been imported to Honolulu from Central and South America, Australia, the Philippines and elsewhere, some insects have accompanied them at times and have succeeded in becoming established in orchid houses in Honolulu. A large number of species have been successfully intercepted by the Plant Quarantine Department and prevented from becoming established here.

The most of our knowledge of what insects are associated with orchids has been gained by the inspection of orchids from other countries or regions, rather than by special study of them in the respective regions which are their natural habitats. The insects treated of, or listed here, are largely those that have been recorded in lists of insects recorded as interceptions by the plant quarantine inspectors at the several ports of entry of the United States. Lists of all such interceptions are printed annually, giving the port of entry, the place of origin and the host plant on which each species was found.

As an example of how orchids can harbor insects and carry them while being imported, in the year 1917, seventy-three distinct species of insects were collected on orchids being imported into the United States, sixty-four of which were from South America. (Sasscer, Journ. Econ. Ent., 11: 128, 1918).

About fifty species have been intercepted on imported orchids at Honolulu from the various tropical countries. Not all of the species are especially orchid insects, as many ants and scale insects which have been thus intercepted are not attached to the orchid plant, but are more general in their habits, or their presence was incidental.

The records of interceptions in the following pages were chiefly taken from the annual reports of the U. S. Bureau of Entomology and Plant Quarantine, Lists of Intercepted Plant Pests, for the 10-year period 1932 to 1942.

Many records of insects injuring orchids were found also in the volumes of *The Review of Applied Entomology*, A, 1913-1940, and in several text books on orchid culture.

In each order, the insects attached to orchids are treated of at first, then follows a list of other species which have been intercepted on orchids, but whose presence might be considered as casual, or incidental, or which may have gained access to the package at the time of packing, or during transit. This segregation may not be entirely accurate, and might perhaps present an entirely different arrangement if a thorough study were made of the insects on orchids in their respective natural habitats.

CURCULIONIDAE

ORCHID WEEVILS IN HAWAII

Of the sixteen known species of orchid weevils (or beetles of the coleopterous family Curculionidae), which are known in various tropical regions of both hemispheres, four have been found on orchids in Hawaii, and yet two other species have been similarly found, which at present have not been determined as to name or original habitat.

The six weevils which have been found on orchids in Honolulu are borers within some part of the plant, and thus could often escape detection and also possibly withstand fumigation. Of course, too, perhaps some of them became introduced at a time prior to the present setup of quarantine methods, when no precautions were taken. Be that as it may, the following species have been found, mostly only occasionally, but at least one species sometimes increased to injurious numbers.

Much of my knowledge regarding orchid weevils in Hawaii has been acquired through the determination for Dr. Harold L. Lyon of specimens which, from time to time, have been found in his orchid houses, or on newly imported orchids. As I proceed, you will see that my notes on local conditions are often the recounting of these incidents.

1. **Orchidophilus aterrimus** (Waterhouse) (pl. XVII-B, fig. 2)

Baridius aterrimus Waterhouse, Ent. Mo. Mag., 10: 226, 1874.

Acythopeus aterrimus, Lea, Trans. Royal Soc. S. Australia, 30: 101, 1906.

Orchidophilus aterrimus, Buchanan, Proc. Haw. Ent. Soc., 9: 45, 1935.

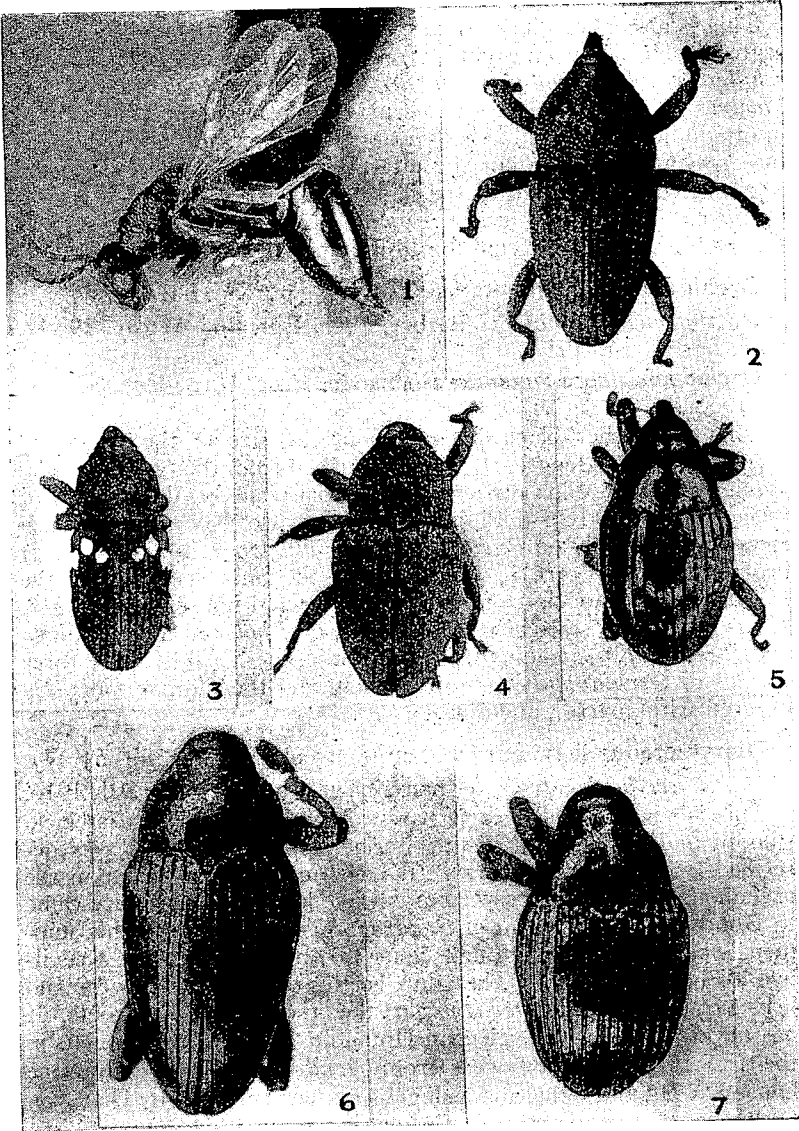
This is the largest of the orchid weevils which have been observed in Hawaii, being 3-6 mm. in length. It is black, with distinct striae on the elytra. (The illustrations will help in distinguishing the species of any specimens found in or on orchids.) This weevil has been intercepted many times in orchids from the Philippines and Straits Settlements, and there is no doubt of its having become introduced from that region. It was first observed in Honolulu in 1910, when it occurred in *Phalaenopsis* in the orchid house of Mr. W. H. Baird. The insect collection at Experiment Station, H.S.P.A., has specimens collected by Dr. H. L. Lyon since that time as follows: 1915, 1920, 1921, 1931, 1932, 1933, 1934, 1935, 1936, 1938, 1943.

The adult beetles feed on orchid flowers and on the tender tissues at or near the growing points. Larvae of the weevil have been taken in Honolulu from the stems of *Phalaenopsis*, *Vanda*, *Renanthera*, *Angraecum*, *Saccolobium*, *Dendrobium*, *Cymbidium* and *Spathoglottis*. This weevil has, at times become so numerous in some orchid collections in Hawaii that its permanent establishment in the Territory may well be feared. This is the more likely because it breeds freely in *Spathoglottis* which is now running wild over large areas on Oahu and Hawaii. As yet, we have no record of its occurrence on *Spathoglottis* in the field.

This weevil has been intercepted at Honolulu on *Vanda* sp. from Japan, on *Rhynchostylis retusa*, *Stauropis lissochiloides*, *Grammatophyllum multiflorum*, *Dendrobium victoria-reginae*, *Phalaenopsis sanderiana*, *P. schilleriana*, *Vanda luzonica*, *Spathoglottis intermedia*, *Trichoglottis brachiata* and *Aerides crassifolium* from the Philippines, on *Oncidium leopardianum* from Dutch East Indies, on *Coelogyne asperata*, *Cypripedium curtisii*, *Dendrobium phalaenopsis*, *Renanthera alba* from Straits Settlements, on orchid from Thailand; in California on *Grammatophyllum speciosum*, *Vanda luzonica*, *Dendrobium superbum*, *Phalaenopsis schilleriana* and *Phalaenopsis amabilis* from the Philippines, on *Oncidium sphacelatum* and *Dendrobium pierardii* from Straits Settlements; at Washington, D.C. on *Grammatophyllum speciosum* from the Philippines.

2. **Orchidophilus peregrinator** Buchanan (pl. XVII-B, fig. 4)

Orchidophilus peregrinator Buchanan, Proc. Haw. Ent. Soc., 9: 46, 1935.



Orchid Insects

1. *Eurytoma orchidearum* (Westwood) : Cattleya-fly $\times 12$.
2. *Orchidophilus aterrimus* (Waterhouse) $\times 8$.
3. *Orchidophilus gilvonotatus* Barber $\times 8$.
4. *Orchidophilus peregrinator* Buchanan $\times 9$.
5. *Diorymerellus laevimargo* Champion $\times 17$.
6. *Pseudocholus* sp. (?) $\times 10$.
7. *Diastethus* sp. (?) $\times 10$.

This is a smaller black species; length 4 mm. It has been intercepted at Honolulu on orchids from the Philippines: *Phalaenopsis schilleriana*, *Phalaenopsis amabilis* and *Grammatophyllum multiflorum*. The only record of its occurrence in Honolulu was in 1928 in orchid house of Mr. F. C. Atherton. This weevil is apt to be confused with *aterrimus*, but the elytral striae are finer and not so pronounced as in the latter species. It has been intercepted also in California on *Vanda coerulea*, *Vanda luzonica*, *Renanthera* sp. and *Phalaenopsis amabilis* from the Philippines.

3. **Orchidophilus gilvonotatus** (Barber) (pl. XVII-B, fig. 3)

Acythopeus gilvonotatus Barber, Proc. Ent. Soc. Wash., 19: 17, pl. 4, figs. 3, 3-a, 1917.

Orchidophilus gilvonotatus Buchanan, Proc. Haw. Ent. Soc., 9: 45, 1935.

This is another black weevil, about the size of the preceding species; 4 mm. in length. It is distinguished from the two preceding species by having four clusters of yellowish scales on the basal third of each elytron. It is a Philippine species also, having been intercepted at Honolulu on *Phalaenopsis amabilis* from those islands. It probably is very rare in Honolulu, as the only specimen in the H.S.P.A. collection is from Dr. Lyon's orchid house, April, 1916. It has been intercepted also in California on *Phalaenopsis stuartiana* and *Phalaenopsis amabilis* from the Philippines. All of these three species of *Orchidophilus* are dull black, and the thorax is densely covered with coarse punctures.

4. **Diorymerellus laevimargo** Champion (pl. XVII-B, fig. 5)

Diorymerellus laevimargo Champ., Ent. Mo. Mag., 52: 201, 1916.

This is a very small weevil, barely 2 mm. in length. It is black, smooth and shiny, with distinct striae on the elytra. It was described from Central America. It has become quite a pest in the greenhouses in New Jersey from whence large numbers once came to Honolulu in a shipment of *Dendrobium phalaenopsis*. This shipment was held in a quarantine house for months until the weevils had all been destroyed. The adult beetles feed on the flowers and leaves of *Cattleya* and *Dendrobium*; the larvae feed in the roots. It has never been very prevalent in Honolulu, as the few specimens in the H.S.P.A. collection were from *Dendrobium* in a quarantine house in 1914 and 1915, and a single specimen collected by Dr. Lyon on flower of *Laelia anceps* at Foster Garden in 1934.

5. **Pseudocholus** or **Ipsichora** sp. (pl. XVII-B, fig. 6)

A single specimen of a large black, shiny weevil, 5 mm. in length, was collected in 1932 by Dr. Lyon on orchid in the orchid house at Foster Garden. Dr. Marshall of the Imperial Institute of Entomology determined it as "near *Pseudocholus* or *Ipsichora*".

6. *Diastethus* sp. (pl. XVII-B, fig. 7)

This also was determined by Dr. Marshall, on a single specimen taken by Dr. Lyon on leaf of an *Oncidium* from Trinidad, 1935. It is a shiny, black species, with the elytra mostly an obscure red. Length about 3.5 mm. The striae on elytra are very distinct, wide and deep. The thorax has few minute punctures.

Probably the most efficient method of dealing with these weevils among orchids or in orchid houses is handpicking. The adult weevils having the habit of feeding more or less on foliage and blossoms, may be readily detected and collected and destroyed. But, as the larvae, which are footless grubs, are borers inside stems or fleshy parts of the plants and cause the most injury, which they may accomplish without external evidence of their presence until the main damage is done, it is a more difficult matter to get rid of them. However, at the first evidence, these larvae should be searched out and destroyed, which may entail the sacrifice of a plant or some vital portion of it. Fortunately, it is inferred that there is not much trouble by these weevils in Honolulu, else the entomologists would have heard more of them. Because they have been found here, even though rarely in some cases, it behooves the orchid fancier to be always on the alert to detect their presence, and to forestall any serious infestations.

ORCHID WEEVILS KNOWN ELSEWHERE THAN IN HAWAII

1. *Cholus forbesii* Pascoe

Proc. Ent. Soc., London, 1876: xxx.

2. *Cholus cattleyae* Champion

Ent. Mo. Mag., 52: 201, 1916.

3. *Cholus cattleyarum* Barber

Proc. Ent. Soc., Wash., 18: 177, 1916.

These three weevils have been found in orchid houses in New Jersey and Wisconsin, especially on *Cattleya gigas*. The larvae feed in the pseudobulbs; the adults feed on leaves and pseudobulbs. These species are tropical American, and *cattleyarum* is a synonym of *cattleyae*. *Cholus cattleyae* has been intercepted at Washington, D.C. and in Puerto Rico on *Cattleya* sp. from Venezuela. *Cholus cattleyarum* was intercepted in California on *Cattleya* sp. from Colombia. *Cholus forbesii* was described from a specimen found among orchids in England, supposed to have been imported from Ecuador. It has been found established in orchid houses in New Jersey, and causing considerable injury.

4. *Cholus nigromaculatus* Champion

Biol. Centr.-Amer., 4 (4): 306, pl. 16, figs. 13, 13-a, 1903.

Described from Panama. Intercepted in California on *Laelia* sp. from Mexico.

5. **Orchidophilus orchivora** (Blackburn)

Baris orchivora Blkb., Trans. Royal Soc. S. Australia, 24: 61, 1900.

Orchidophilus orchivora, Buchanan, Proc. Haw. Ent. Soc., 9: 45, 1935.

This black weevil was described from Queensland, Australia. It was bred from pseudobulbs of *Dendrobium canaliculatum*. It became established in New Jersey greenhouses a number of years ago, where *Dendrobium findlayanum* and *Dendrobium crystallinum* were the orchids specially attacked. It has been intercepted in California on *Dendrobium spectabile* from Borneo. It is dull black and smaller than *O. aterrimus*.

6. **Apotomorrhinus orchidearum** Kolbe

Gartenflora, 55: 4, 1906.

This black weevil is related to the species of *Orchidophilus*, and it is not certain whether it may be a synonym of one of the species. Little is known of it since its description in Berlin. Schlechter in 1927 lists it as a synonym of *Acythopeus aterrimus*.

7. **Eucactophagus weissi** Barber

Proc. Ent. Soc. Wash., 19: 21, pl. 4, figs. 4, 4-a, 4-b, 1917.

This is quite a large yellow and black weevil described from specimens in orchid houses in New Jersey where it has been troublesome. It is probably of tropical American origin. The larva lives in soft-bulbed orchids, and can be very injurious. It has been intercepted at Washington, D.C. on *Cattleya* sp. from Colombia.

8. **Eucactophagus graphipterus** Champion

Biol. Centr.-Amer., Coleoptera, 4 (7): 98, pl. 4, figs. 35, 35-a, 1910.

Another Central American weevil, which was once found in a New Jersey orchid house.

9. **Eucactophagus biocellatus** Barber

Proc. Ent. Soc. Wash., 19: 22, pl. 4, fig. 5, 1917.

This weevil was described from a single specimen from Canal Zone, Panama. It is presumably an orchid insect, though the author does not so state in his description which is included in a paper on orchid weevils.

10. **Diorymerellus obliteratus** Champion

Biol. Centr.-Amer., 4 (5): 252, 1908.

A small weevil described from the Antilles. Reported on *Habenaria* and *Vanilla* in Puerto Rico.

11. **Phloeophagosoma orchidarum** Marshall
 Stylops, 1 : 216, 1932.
 Described from Java where it was reared from orchids. I have found no other record.
12. **Omobaris calanthes** Marshall
 Bull. Ent. Research, 17 (3) : 218, 1927.
 This is a small shiny black weevil. Described from Java. The adults reported to damage the leaves of the orchid *Calanthe veratrifolium*.
13. **Baris** sp.
 Reported by Fullaway as intercepted on orchids at Honolulu.
14. **Tadius erirhinoides** Pascoe
 Ann. Mus. Genova, (2) 2 : 253, 1885.
 Described from Macassar. It has been intercepted at Honolulu on *Phalaenopsis amabilis* and *Dendrobium taurinum* from the Philippines. Intercepted in California on *Cypripedium haynaldianum* from the Philippines.
15. **Ampelogypter** sp.
 This weevil was reported in California as intercepted on orchid from New Jersey.
16. **Centrinus epidendri** Murray
 Gardner's Chronicle, 1869 : 1279.
 Described in England from *Epidendrum* from South America. Schlechter, in 1927, apparently would consider *Acythopaeus aterimus* a synonym of this species.
17. **Otiorhynchus sulcatus** (Fabr.)
Curculio sulcatus Fabr., Syst. Ent. : 155, 1775.
Otiorhynchus sulcatus, Kremnes, Tradgarden, Stockholm : 145, 1916.
 The adults are reported in Sweden as damaging the leaves of orchids and several other kinds of plants in hot houses; the larvae attack the roots.
18. **Cylas formicarius** (Fabr.)
Brentus formicarius Fabr., Ent. Syst. Suppl. : 174, 1798.
Cylas formicarius, LeConte, Proc. Amer. Phil. Soc. 5 : 327, 1876.
 This sweetpotato weevil has been reported as intercepted in California in pseudobulbs of *Grammatophyllum speciosum* from the Philippines.
19. **Eucalandra setulosa** (Gyllenhal)
Sitophilus setulosus Gyllenhal, Schoen. Curcul. ; 4 (2) : 969, 1838.

Eucalandra setulosa, Csiki, Junk Col. Cat., pars. 149: 77, 1936.
Intercepted in New Jersey on *Cattleya* sp. from Colombia. The species was described from Mexico.

20. **Phelypera distigma** (Boheman)

Phytonomus distigma Boh., Schoen. Gen. Curc., 6 (2) : 344, 1842.

Phelypera distigma, Champion, Ann. Soc. Ent. France, 1867 : 465.

Intercepted in California on *Cattleya deckeri* from the Canal Zone.

21. **Nassophasis foveata** Waterhouse

Trans. Ent. Soc. London, 1879 : 18.

Described in England on orchid (*Aerides fieldingii*) from Khasia Hills, India.

22. **Nassophasis morreni** (Roelofs)

Sphenophorus morreni Roelofs, Ann. Soc. Ent. Belgique, 29 : 10, 1885.

Nassophasis morreni, Schlechter, Die Orchideen : 899, 1927.

Described from Ecuador, also known from Brazil, and has been found in England on *Cattleya* from the tropics.

23. **Nassophasis orchidearum** (Voss)

Sphenophorus orchidearum Voss, Orchis, 6 : 94, 1912.

Nassophasis orchidearum, Schlechter, Die Orchideen : 898, 1927.

Described from Central America and South America. The adult beetles feed on the flowers of *Odontoglossum* and *Dendrobium*.

24. **Conotrachelus naso** LeConte

Rhynchophora of North America : 231, 1876.

This weevil has been intercepted in California with orchid from Colombia.

SCOLYTIDAE

1. **Xylosandrus morigerus** (Blandford)

Insect Life, 6 : 264, 1894.

This scolytid beetle was described in *Dendrobium* from New Guinea. It attacks the stems, the adults boring in to make excavations for their young, as they are the "ambrosia" type of scolytid, the larvae feeding on fungus growth which develops in the excavations made by the adults. It has been intercepted many times in orchids imported from Australia, but apparently never became established in Honolulu. It was intercepted in California in *Dendrobium phalaenopsis* from Borneo and in *Dendrobium phalaenopsis schroederiana* from Australia.

Another species: *Xylosandrus morstatti* (Hagedorn) has been described from Africa where it is injurious to coffee. Both of these insects occur on orchids in Java, especially in *Dendrobium* stems.

2. *Xylosandrus luzonicus* (Eggers) ?

Scolytoplatypus luzonicus Eggers, Ent. Bl., 31: 244, 1935.

Xylosandrus luzonicus, U.S.D.A. Interception List for 1934: 74, 1935.

Intercepted at Honolulu on *Dendrobium taurinum* from the Philippines.

3. *Xyleborus perforans* (Wollaston)

Tomicus perforans Wollaston, Cat. Col. Madiera: 96, 1857.

Xyleborus perforans, Hagedorn, Junk Col. Cat., XXVI, pars 4: 108, 1910.

This beetle similarly sometimes attacks *Dendrobium* stems, but it also attacks many other plant stems or tree trunks, usually when in diseased, dying or dead condition.

MORDELLISTENIDAE

1. *Mordellistena cattleyana* Champion

Ent. Mo. Mag., (2) 24: 56, 1913.

Described from beetles bred from leaves of *Cattleya* in England. The plants were believed to have been imported from Venezuela. The larvae of this beetle are leafminers in such orchids as *Cattleya labiata* from South America, and *Vanda coerulea* from India and Burma.

Intercepted at Washington, D.C., on *Epidendrum bifidum* from Dominican Republic, on *Cattleya* sp. from Colombia, on *Oncidium* sp. from Guatemala, on *Cattleya* sp. from Brazil. Intercepted in New Jersey on *Cattleya* sp. from Brazil, Venezuela, Colombia and Canal Zone.

2. *Mordellistena chapini* Ray

Proc. U. S. Nat. Museum, 84 (3016): 240, 1937.

Intercepted in Washington on *Cattleya* sp. from Colombia.

Described from a male specimen which issued from a leaf of *Cattleya* sp. intercepted at Washington, D.C. from Venezuela, and a male specimen taken as a leafminer in *Cailloga* sp. from Brazil, intercepted at Washington, D.C.

Also intercepted in New Jersey on *Cattleya* sp. from Peru, and on orchid from Colombia; in Texas on *Lycaste skinneri virginialis* from Mexico; at Washington, D.C. on *Cattleya* sp. from Colombia.

3. *Mordellistena epidendrana* Ray

Proc. U. S. Nat. Museum 84 (3016): 239, 1937.

Described from four specimens taken in leaves of *Epidendrum* sp. from Dominican Republic intercepted at San Francisco.
These three species apparently are attached to orchids.

4. **Mordellistena beyrodti** Lengerken

Zool. Jahrb. Jena, Abt. Syst., 44: 579-594, 18 figs., 1922.

This species is considered as a synonym of *M. cattleyana*. The citation above contains a full description of habits and life history, illustrated with 18 figures.

CERAMBYCIDAE

1. **Diaxenes dendrobii** Gahan

Ann. Mag. Nat. Hist., (6) 13: 520, fig., 1894.

This cerambycid beetle was described in England from specimens found associated with *Dendrobium nobile* plants imported from Burma. The leaves and pseudobulbs were injured. In 1897 this beetle was reported established in orchid houses in Great Britain, the adults eating the leaves, and the larvae feeding in pseudobulbs.

2. **Diaxenes taylori** Waterhouse

Ann. Mag. Nat. Hist., (5) 13: 128, 1884.

Described from a specimen gnawing off stems of *Phalaenopsis* in the Royal Nursery, Chelsea. The plants were from Manila. Later it was taken from stem of *Saccolobium coeleste*.

3. **Diaxenes phalaenopsis** Fisher

Ent. Meded. Ned.-Ind., 3: 53-54, 1937.

The adult beetles feed voraciously at night on the leaves of various orchids in Java and Sumatra. The larvae bore in the roots.

4. **Parmenonta valida** Thomson

Physis, 2: 158, 1868.

Intercepted in California on *Oncidium splendidum* from Mexico. Probably not an orchid insect.

HISPIDAE

1. **Agonia spathoglottis** Uhmann

Zeit. Wiss. Insekt. Biol., 24: 147, 1929.

Described from Sunda Islands and the variety *undata* from Buitenzorg, Java. This species is a leafminer in *Spathoglottis*.

2. **Callispa duodecimmaculata** Chapuis

Ann. Soc. Ent. Belg., 19: 17, 1876.

This 12-spotted hispid beetle was described from Java and the Philippines. It occurs on the leaves of *Spathoglottis plicata* and

other species of *Spathoglottis*. The larvae feed in the partly unfolded young leaves.

3. **Gonophora xanthomelaena** (Wiedemann)

Hispa xanthomelaena Wied., Zool. Mag. 2 (1) : 80, 1823.

Gonophora xanthomelaena, Gemm. & Har., Cat. Col., 11 : 3607, 1874.

This is a leaf-mining hispid beetle described from Sumatra, Java and Borneo. The larvae attack several kinds of orchids as: *Arun-dina*, *Phalaenopsis*, *Spathoglottis* and *Vanda*.

4. **Oncocephala angulata** Gestro

Ann. Mus. Civ. Genova, 2 (2) : 172, 1885.

This is another leaf-mining hispid. Described from Sumatra, and occurs also in Java, in orchids of the genus *Coelogyne*, but does not cause much injury.

CHRYSOMELIDAE

1. **Crioceris subpolita** Motsch. ?

Motschulsky, Etud. Ent., 9 : 22, 1860.

Both the larvae and adults of this yellowish chrysomelid beetle feed on the flowers of *Vanda* and *Spathoglottis* and other orchids in Java and Sumatra. They may also eat the fruit and leaves when flowers are not available.

2. **Lema pectoralis** Baly

Trans. Ent. Soc. London, (3) 4 : 9, pl. 1, fig. 3, 1865.

This leafbeetle was described from Singapore. It is reported in the Federated Malay States as feeding on *Vanda joaquim* flowers.

These two species may possibly be considered orchid insects.

LIST OF INTERCEPTED BEETLES

Beetles which have been intercepted on imported orchids, but whose presence probably could be considered as casual, incidental, or accidental, and not specifically attached to orchids, are listed here.

Besides the beetles in the following list, quite a considerable number have been intercepted on orchids from various regions, but were determined only to genus or family. Many of them no doubt are the same insects as are included in the list.

CHRYSOMELIDAE

1. **Physonota citrinella** Boheman

Intercepted in California on *Oncidium cavendishianum* from Guatemala.

2. **Physonota eucalypta** Boheman
Intercepted in California on *Laelia speciosa* and *Stanhopea* sp. from Mexico.
3. **Physonota mexicana** Boheman
Intercepted in California on *Laelia* sp. from Mexico.
4. **Plagiodera flosculosa** Stål
Intercepted in California on orchid from Mexico.
5. **Calligrapha aeneopicta** Stål
Intercepted at Washington, D.C., on orchid from Mexico.
6. **Calligrapha diversa** (Stål)
Intercepted in California on orchid from Mexico.
7. **Calligrapha notatipennis** Stål
Intercepted in Texas on orchid from Mexico.
8. **Calligrapha fulvipes** Stål
Intercepted in California on *Masdevallia* sp. from Costa Rica.
9. **Calligrapha pantherina** Stål
Intercepted in California on orchid from Mexico.
10. **Ogdoecosta catenulata** (Boheman)
Intercepted in California on orchid from Mexico.
11. **Ogdoecosta biannularis** (Boheman)
Intercepted in Texas on orchid from Mexico.
12. **Deloyala guttata** (Olivier)
Intercepted in Texas on orchid from Mexico.

TENEBRIONIDAE

1. **Gonocephalum depressum** (Fabricius)
Intercepted in California on *Phalaenopsis sanderiana* from the Philippines.
2. **Mesomorphus villiger** (Blanchard)
Intercepted at Honolulu in orchid debris from the Philippines.
3. **Platydema marseuli** Lewis
Intercepted at Honolulu in orchid debris from the Philippines.
4. **Zophobas morio** (Fabricius)
Intercepted at Washington, D.C., on *Cattleya* sp. from Venezuela and Colombia; in California on *Cattleya gigas* from Colombia.

5. **Tribolium castaneum** (Herbst.)

Intercepted at Honolulu on orchid shipment from Manila.

6. **Scleron ferrugineum** (Fabricius)

Intercepted at Honolulu on *Dendrobium macrostachyum* from the Dutch East Indies.

7. **Opatrinus gemellatus** (Olivier)

Intercepted in New Jersey on *Cattleya* sp. from Venezuela.

8. **Uloma fracticollis** Gebien

Intercepted at Honolulu with orchids from the Philippines.

CUCUJIDAE

1. **Monanus concinnulus** (Walker)

Intercepted at Washington, D.C., on orchid from Colombia; in California on *Cattleya* sp. from Colombia.

2. **Telephanus setulosus** Sharp

Intercepted in Louisiana on orchid from Costa Rica.

3. **Telephanus grossicornis** Nevermann

Intercepted at Washington, D.C., on orchid from Colombia.

4. **Silvanus vulgaris** Grouvelle

Intercepted in California on *Cattleya* sp. from Colombia.

5. **Cryptamorpha dejardini** (Guer.)

Intercepted in New Jersey with *Schomburgkia* sp. from Trinidad.

TRIXAGIDAE

Trixagus trivialis (Horn)

Intercepted at Honolulu on *Trichopilia suavis* from Canal Zone.

LAMPYRIDAE

Aspidosoma costatum Gorham

Intercepted at Washington, D.C., on *Cattleya* sp. from Venezuela; in Puerto Rico on orchid from Venezuela.

ELATERIDAE

Aeolus pulchellus Candèze

This beetle was intercepted in Texas with *Stanhopea* sp. from Mexico.

Several other Elateridae were intercepted, but determined only to genera.

DERMESTIDAE

Dermestes vulpinus Fabr.

Intercepted at Honolulu in orchid packing from Manila.

LYCTIDAE

Lyctoxylon japonum Reitter

Intercepted in California on *Phalaenopsis sandariana* from the Philippines.

COLYDIIDAE

Minthea rugicollis (Walker)

Intercepted in California on *Phalaenopsis sandariana* from the Philippines, on *Cattleya* sp. from Colombia.

ANTHRIBIDAE

Araecerus fasciculatus (Degeer)

Intercepted in California on *Dendrobium macrophyllum* from Borneo.

HYDROPHILIDAE

Oosternum costatum Sharp

Intercepted at Washington, D.C., on *Lycaste aromatica* from Guatemala.

SCAPHIDIIDAE

Cyparium terminale Matthews

Intercepted in California on *Oncidium cavendishianum* from Guatemala.

PTINIDAE

Ptinus tectris Boieldieu

Intercepted in California on *Cymbidium lowianum* from India.

MELANDRYIDAE

Ischyomius chevrolati Champion

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia.

COCCINELLIDAE

Epilachna varivestis Mulsant

Intercepted in Arizona on orchid from Mexico.

SCARABAEIDAE

Trichius ornatus Jordan

Intercepted in California on *Cymbidium eburneum* from India.

ENDOMYCHIDAE

1. **Trochoideus americanus** Buquet

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia.

2. **Epopterus ocellatus** (Olivier)

Intercepted at Washington, D.C., on orchid from Venezuela.

3. **Acinaces lebasi** Gerstaecker

Intercepted at Washington, D.C., on orchid from Colombia.

SCOLYTIDAE

Xyleborus coffeae Wurth

Intercepted in Kenya, boring in orchids from Queensland.

HYMENOPTERA

EURYTOMIDAE

Eurytoma orchidearum (Westwood) (pl. XVII-B, fig. 1)

Trans. Ent. Soc. London, 1882: 323, pl. 13, figs. 1-14.

This is the so-called "Cattleya fly", which, however, is not a true fly but a member of the order Hymenoptera. Described in the genus *Isosoma*, it stood in that genus for many years, but since 1923, it is found in *Eurytoma* in literature on economic entomology in the United States. It is a small insect, about 4 mm. in length, whose larvae were found feeding within buds and pseudobulbs of various species of *Cattleya* from Brazil. When first studied, it was thought to be a parasite of some other insect (which, however, was not discovered) since it is in a family which has chiefly parasitic habits. Later studies revealed that all species of the genus *Isosoma* are plant feeders, the larvae chiefly feeding in stems of various grasses. It was found established in greenhouses in Massachusetts as early as 1889, and was supposed to have come on plants imported from New Grenada (Colombia), South America.

In more recent years, it became the most important pest on orchids in the United States. It has many times been intercepted in imported orchids at Honolulu. It was established here as early as 1914, for in that year Dr. Lyon reared adults from orchids which had been obtained locally. He succeeded in eradicating them from his greenhouse, and apparently others have had similar results, for the pest has not come to our attention of recent years.

It has been intercepted many times at Washington, D.C., on *Cattleya* sp. from Venezuela, Colombia, Brazil and Costa Rica; in California on *Cattleya trianaei* and *C. gigas* from Colombia, on *C. mossiae* from Venezuela and on orchids from Brazil, New York and England; in New York on *Cattleya* sp. from Canal Zone; in New Jersey on *Cattleya* sp. from Brazil, Colombia, Venezuela and Peru.

XYLOCOPIDAE

Xylocopa brasilianorum (Linn.)

Intercepted at Honolulu in "orchid logs" from Manila.

FORMICIDAE (Ants)

Many kinds of ants have been found in packages of imported orchids. Sometimes colonies of ants are found among roots of imported plants. They may have been present on the plant or in the packing material when the packing was done, or they may have gained access at some time during transit. The most of them, as given in reports of interceptions were determined only to the genus, as: *Pheidole* sp., *Prenolepis* sp., *Solenopsis* sp., *Crematogaster* sp., *Ponera* sp., *Camponotus* sp., *Tapinoma* sp., *Tetramorium* sp., *Odontomachus* sp., *Dolichoderus* sp., *Tetraoponera* sp., etc. No doubt, some of these were actually the same species as those which were specifically determined as follows:

1. **Euponera luteipes** (Mayr)

Intercepted at Honolulu in orchid shipment from Manila.

2. **Xenomyrmex stollii** Forel, var. **mexicanus**

Intercepted in California with *Oncidium cavendishianum* from Guatemala.

3. **Iridomyrmex humilis** Mayr

Intercepted at Honolulu with *Cattleya trianaei* from California.

4. **Monomorium carbonarium** (Smith) var. **ebenina**

Intercepted at Washington, D.C., in orchid packing from Colombia; in New York with *Oncidium phymatochilum* from Costa Rica.

5. **Monomorium pharaonis** (Linnaeus)

Intercepted at Honolulu with orchids from Java and Manila.

6. **Monomorium floricola** (Jerdon)

Intercepted at Honolulu in orchid shipment from Manila.

7. **Pheidole anastasii** Emery

Intercepted at Washington, D.C., with *Trichopilia* from Costa Rica.

8. **Pheidole javana** Mayr

Intercepted at Honolulu in orchids from Manila.

9. **Macromischa luciliae** Mann

Intercepted at Honolulu with *Oncidium splendidum* from Guatemala.

10. **Wasmannia auropunctata** (Roger)

Intercepted in Pennsylvania with orchid from Belgium; at Washington, D.C., with *Cattleya* sp. from Costa Rica; in Louisiana with orchid from Brazil; in Honolulu with several species of orchids from Canal Zone; in California with *Oncidium crispum* from Brazil and an orchid from Panama.

11. **Cyphomyrmex rimosus** (Spinola) var.

Intercepted at Washington, D.C., with orchid from Colombia.

12. **Dolichoderus bituberculatus** (Mayr)

Intercepted at Honolulu with *Dendrobium crumenatum* from the Philippines.

13. **Technomyrmex albipes** (Smith)

Intercepted in California with *Aerides lawrenciae* and *Grammatophyllum speciosum* from the Philippines; in Honolulu with *Dendrobium densiflorum*, *D. taurinum* and *Rhynchostylis retusa* from the Philippines, and several kinds of orchids from Straits Settlements; in Washington with *Dendrobium dearei* from the Philippines.

14. **Iridomyrmex iniquus** Mayr

Intercepted at Washington, D.C., with *Cattleya* sp. from Colombia and with orchid from Venezuela; in New York with orchid from Venezuela.

15. **Iridomyrmex iniquus nigellus** Emery

Intercepted in California with *Cattleya trianaei* from Colombia and *Cattleya* sp. from Venezuela; at Washington, D.C., with *Cattleya* sp. from Colombia and Venezuela and wild orchid from Costa Rica; at Puerto Rico with orchid from Venezuela; in the state of Washington with *Cattleya* sp. from Colombia.

16. **Iridomyrmex melleus** Wheeler

Intercepted at Honolulu with *Laeliocattleya* hybrid, *Cypripedium aladin* and *Phalaenopsis* sp. from France; at Washington, D.C., with *Dendrobium* sp. from France.

17. **Plagiolepis foreli** Santschi

Described from specimens found on orchids in the Botanical Gardens at Zurich.

18. **Plagiolepis longipes** (Jerdon)

Intercepted at Honolulu in orchid packing from Manila.

19. **Strumigenys lewisi** Cameron

Intercepted at Honolulu with orchids from Manila.

20. **Odontomachus haematoda** (Linn.)

Intercepted at Honolulu with *Grammatophyllum speciosum* from the Philippines.

LEPIDOPTERA

LYCAENIDAE

Chliaria othona dendrobii Roepke

Chliaria dendrobii Roepke, Teysmania, Batavia, 30 (3) : 115-121, 1919.

Chliaria othona dendrobii, Leefmans, Bandoeng, N.V., Mij., Varkink, 1931.

The larvae of this small blue and white butterfly injure orchids in Java and the Netherlands Indies. Several kinds of orchids are attacked: *Dendrobium phalaenopsis*, *Dendrobium mirbelianum*, *Phalaenopsis violacea*, *Phalaenopsis amabilis*, *Arundina* sp., *Spathoglottis* sp., *Phaius* sp. The larvae feed on the flower buds and can thus do great damage to plants in the open, but would not be expected to be present in a greenhouse.

CASTNIIDAE

1. **Orthia therapon** (Kollar)

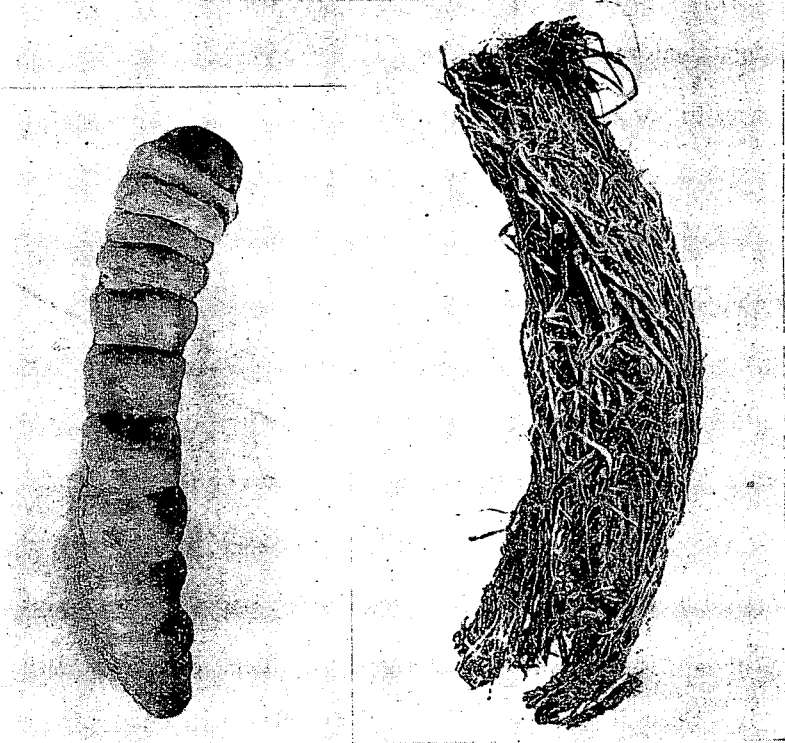
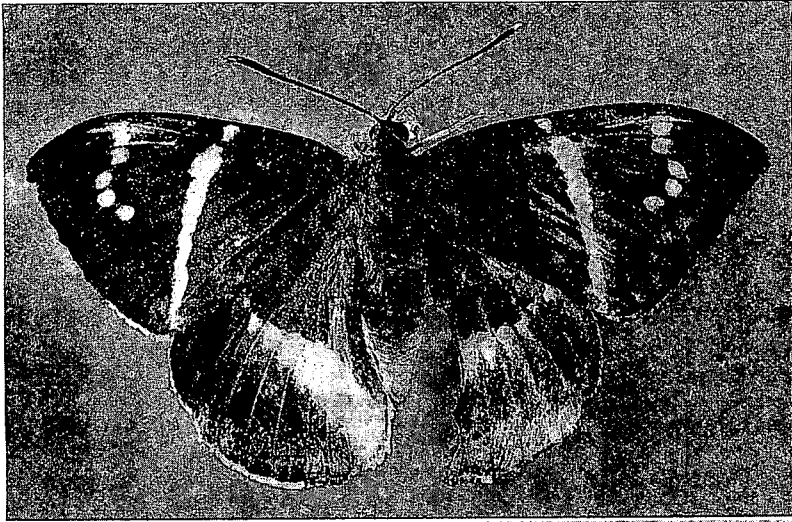
Castnia therapon Kollar, Lep. Bras. Ann. Wien. Mus. 2 : 218, pl. 13, fig. 3.

Orthia therapon, Schlechter, Die Orchideen : 870, 874, 888, 1927.

This large butterfly-like moth is a native of Brazil. It was reported in New Jersey orchid houses in 1916. The large caterpillars bore in the rhizome and up into the bulb of such orchids as *Oncidium crispum*, *Cattleya labiata* and *Catasetum* spp. It probably has occurred only in imported plants. It was intercepted at Washington, D.C., in *Cattleya* sp. from Brazil. It was once reared from a *Stanhopea* plant in orchid-house in England. The *Stanhopea* had originated in Brazil.

2. **Castnia cronis** Cramer var. **corningii** Edw.

Edwards, Insect Life, 3 : 316, 1891.



Castnia licus Fabricius
(Courtesy of Experiment Station, H.S.P.A.)

The variety *corningii* was reared from the roots of an orchid, *Laelia majalis*, at Albany, N.Y. The habitat was given as Oaxaca, Mexico.

Both of these large moths are likely to be transported as larvae within the rhizomes or bulbs of orchids coming from their home country, just as *Castnia licus* was reared in Honolulu in 1935 from the corm of *Heliconia angustifolia*, which was being held in quarantine greenhouse without the presence of the larva being known prior to the emergence of the moth.

3. *Castnia licus* (Fabricius) (pl. XVII-C)

Papilio licus Fabr., Ent. Syst. 3, 1: 45, 1793.

Castnia licus, Westwood, Trans., Linn. Soc., 2nd Series, Zool., 1: 173, 1875.

This large moth has been called the giant sugarcane borer, as its large larvae were found boring in sugarcanes in British Guiana. The larvae have also been recorded as feeding in orchid roots in the upper Orinoco Valley.

GEOMETRIDAE

Negata chlorocrota Hampson

The spanworn caterpillars of this geometrid moth feed on the leaves of several kinds of orchids in Java. The young caterpillars seek out the youngest leaves and eat off the upper epidermis; older caterpillars move to large leaves and eat the whole leaf substance, notching the margin. Also the blossom buds may be eaten, preventing flower development.

LIMACODIDAE

Oxyplax ochracea (Moore)

Aphendala ochracea Moore, Lep. Ceylon, 2: 129, pl. 129, figs. 3, 3a (Zoological Record, Insecta: 196, 1883).

Oxyplax ochracea, Hampson, Fauna Br. Ind., Moths 1: 376, fig. 256, 1892.

The larvae of this limacodid moth eat holes in the leaves of several kinds of orchids throughout Java; occurs also in Ceylon.

LITHOSIADAE

Automolis inexpectata (Rothschild)

Halisidota inexpectata Roths., Nov. Zool., 17: 70, pl. 13, fig. 25, 1910.

Automolis inexpectata, Hampson, Cat. Lep. Phalaenae, Brit. Mus., 2, Suppl.: 175, 1920.

Described from Venezuela and Peru. Has been intercepted in New Jersey on *Cattleya* sp. from Colombia.

LIPARIDAE

1. *Orgyia postica* Walker

Cat. Lep. Br. Mus., 4: 803.

2. *Dasychira costalis* Walker

Cat. Lep. Br. Mus., 32: 365.

The hairy caterpillars of these two tussock moths feed on the leaves, inflorescence, flower buds and root tips of *Dendrobium* spp. in Java and the Netherlands Indies, also India. They are not confined to orchids, however, but feed on leaves of several other plants as well.

PLUSIADAE

Plusia chalcites (Esper)

Noctua chalcites Esp., Nat. Eur. Schmett., 4: pl. 141, fig. 3, 1789.

The looping caterpillars of this moth sometimes destroy the buds of orchids growing in the open in Honolulu. *Phaius* and *Spathoglottis* are especially subject to attack.

PSYCHIDAE

Thyridopteryx ephemeraeformis (Haworth)

British Lepidoptera: 72, 1803.

This bagworm has been intercepted in California on orchids from Panama. It has a wide range of food plants in the eastern United States.

PYRALIDAE

Lamprosema schistisemalis (Hampson)

Nacoleia schistisemalis Hamps., Ann. Mag. Nat. Hist., (8), 9: 632, 1912.

This pyralid moth has a range from the Bahamas and Panama to Argentina. It has been intercepted in New Jersey on orchids from Venezuela.

TORTRICIDAE

Platynota rostrana Walker

Cat. British Museum, Lep., 28: 290, 1863.

The larvae of this tortricid moth have been reported feeding on leaves of *Vanilla* in Puerto Rico.

Tortricid

Intercepted at Washington, D.C., on *Dendrobium nobile* from India.

Tortricid

Intercepted at Washington, D.C., on *Cattleya* sp. from Venezuela.

Olethreutid

Intercepted at California on *Dendrobium secundum* from Thailand.

COSMOPTERYGIDAE

Cosmopteryx sp. ?

Leafminers were found in orchids in New Caledonia by F. X. Williams. They failed to mature, but the pupae indicated that they might belong to this lepidopterous genus.

ACROLOPHIDAE

Acrolophus fervidus Busck

Proc. Ent. Soc. Wash., 14: 222, 1912.

Described from Mexico and Costa Rica without mention of food plant. Has been intercepted at Washington, D.C., on *Cattleya trianaei* from Colombia.

Larvae of about a score or more of different kinds of moths have been intercepted with imported orchids, or in orchid packing, at several ports of entry and from various tropical regions, but were not specifically determined. Usually only named by genus and often only by family.

DIPTERA

CECIDOMYIIDAE

1. Parallelodiplosis cattleyae (Molliard)

Cecidomyia cattleyae Moll., Marcellia, 1: 165, pl. 2, 1903.

Parallelodiplosis cattleyae, Felt, N. Y. State Mus., Bull. 180: 89, 1915.

This is the *Cattleya* midge whose small yellow maggots live in galls on the roots of the plants, one to seven per gall. It is reported that in New Jersey, orchids imported from Guatemala often have the roots badly disfigured by these galls. Dr. Lyon relates the occurrence in Honolulu of the galls on roots of *Cattleya* imported from England, and that the maggots in the galls had survived fumigation. This is a demonstration of the uncertainty of killing insects within plant structures by fumigation. This pest has been intercepted a number of times on imported orchids, but is not known to have become established in Honolulu. It was intercepted on *Cattleya mendelli*, *C. triumphans*, *C. warscewiczii*, *C. gigas sandariana* and *Laeliocattleya* sp. from England, on *Cattleya deckeri*

from Canal Zone; at Washington, D.C., on *Cattleya warscewiczii sanderiana* from Colombia; in Louisiana on orchid from Costa Rica.

TEPHRITIDAE

2. *Anastrepha striata* Schiner

This fruitfly was intercepted in New Jersey with *Cattleya* sp. from Venezuela.

ANTHOMYIIDAE

3. *Helina buhri* Hering

This little fly is recorded as a leafminer in *Orchis latifolia* and *Orchis maculata* in north Germany.

HETEROPTERA

PLANT BUGS ATTACHED TO ORCHIDS

MIRIDAE

1. *Mertila malayensis* Distant

Ann. Mag. Nat. Hist., (7) 13: 113, 1904.

This bug is orange-red with legs and wings mostly indigo-black. Described from Singapore, and also recorded in Palawan, Burma, Java, India and the Netherlands Indies. It specially attacks *Phalaenopsis amabilis*, ovipositing in the leaves, and puncturing them to suck the sap. It has been intercepted in quarantine at Honolulu on *Aerides lawrenciae*, *Phalaenopsis sanderiana*, *Renanthera storiei* and *Vanda* sp. from the Philippines; in California on *Dendrobium taurinum*, *Phalaenopsis amabilis* and *Renanthera storiei* from the Philippines.

2. *Tenthecoris bicolor* Scott

Ent. Mo. Mag., 23: 65, 1886.

Coloration red and purplish black, somewhat similar to the preceding bug. Described from South America; occurred on *Cattleya aelandiae* at Bahia, Brazil. It also occurs on *Laelia* and *Sophronitis*. It attacks orchids in cultivation and in the forest in Brazil. This bug has been intercepted at Honolulu on *Cattleya schilleriana* from Brazil; at Washington, D.C., on *Cattleya* sp. from Colombia and Venezuela; in California on *Cattleya gigas* from Colombia, on *Cattleya* sp. from Brazil, Colombia, Venezuela, Canal Zone, Costa Rica; in New Jersey on *Cattleya luddemanniana* from Venezuela, on *Epidendrum* sp. and *Laelia* sp. from Brazil, on *Oncidium* sp. from Trinidad; in Texas on orchids from Colombia, Venezuela and Mexico; in New York on *Cattleya mossiae*, var. from Venezuela; in Puerto Rico on *Cattleya mossiae* from Venezuela.

Ecclitotarsus orchidearum Reuter is a synonym of the above.

3. *Neofurius carvalhoi* Costa Lima

Orquidea, 4 (3) : 104, 1942.

Described from orchids in Brazil, and I have found no other record.

4. *Neoneella zikani* Costa Lima

Orquidea, 4 (3) : 104, 1942.

Described from orchids in Brazil, and I have found no other record.

5. *Eurycipitia vestitus* (Distant)

Ecclitotarsus vestitus Dist., Biol. Centr.-Am., Rhynch. Het. : 284, 1884.

Eurycipitia vestitus, U.S.D.A., Bur. Ent. and Plant Quarantine, Intercepted List, 1941 : 16.

Probably should be considered an orchid bug as it has been intercepted so frequently. Intercepted in California on *Cattleya ludemanniana* and *C. mossiae* from Venezuela, on *Epidendrum* sp. from Honduras, on *Oncidium cavendishianum* and *O. splendidum* from Guatemala, on orchids from Mexico and Colombia; in Texas on orchids from Mexico, Guatemala and Colombia; in New Jersey on *Cattleya* spp. from Brazil, Costa Rica and Guatemala; in Puerto Rico on orchids from Mexico and Guatemala; at Washington, D.C., on orchid from Venezuela.

MISCELLANEOUS BUGS INTERCEPTED ON ORCHIDS

Besides the five preceding bugs, a large number of species has been intercepted, at one time or another, on imported orchids from several places. Apparently these were only incidentally present on the orchids and would not be considered as orchid insects. These were mostly of four families of plant bugs: Coreidae, Pentatomidae, Lygaeidae, and Miridae, but there were scattering ones in other families. The species of the following list were taken from U.S.D.A. records of interceptions on orchids during the years 1932-1942, and demonstrates the necessity of careful quarantine inspection to prevent introduction of some of these bugs which might become pests on many kinds of plants.

CYDNIDAE

1. *Galgupha punctifer* McAtee & Malloch

Intercepted in Texas in soil around orchid plant from Mexico; in Louisiana on orchid from Honduras.

2. *Galgupha guttiger* (Stål)

Intercepted at Honolulu on *Oncidium luridum intermedium* from Dominican Republic.

3. **Geocnethus lugubris** (Stål)

Intercepted in California on *Cattleya trianaei* from Colombia.

4. **Geocnethus nigrocinctus** (Signoret)

Intercepted in New Jersey on orchid from Colombia.

PENTATOMIDAE

5. **Lincus dentiger** Breddin

Intercepted at Washington, D.C., in orchid packing from Venezuela.

6. **Paralincus terminalis** (Walker)

Intercepted at Washington, D.C., on *Cattleya* sp. from Venezuela.

7. **Edessa cornuta** Burmeister

Intercepted in Arizona on orchid from Mexico.

8. **Mormidea collaris** Dallas

Intercepted in Texas on orchid from Mexico.

9. **Mormidea cubrosa** (Dallas)

Intercepted in Arizona and California on orchids from Mexico.

10. **Oplomus mundus** Stål

Intercepted in Texas on orchid from Mexico.

11. **Oplomus pulcher** Dallas

Intercepted in Texas on orchid from Mexico.

12. **Trichopepla californica** Van Duzee

Intercepted in California on *Laelia* sp. from Mexico.

13. **Pachycoris torridus** (Scopoli)

Intercepted in Texas on orchid from Mexico.

COREIDAE

14. **Acidomeria rustica** Stål

Intercepted at Washington, D.C., on orchid from Nicaragua.

15. **Capaneus odiosus** Stål

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia; in California on *Laelia* sp. from Mexico; in Puerto Rico on *Cattleya* sp. from Venezuela.

16. **Anasa tenebricosa** Distant

Intercepted in California on *Laelia* sp. from Mexico.

LYGAEIDAE

17. *Lygaeus guatemalanus* Distant

Intercepted at Washington, D.C., on *Cattleya* sp. from Venezuela.

18. *Clerada apicicornis* Signoret

Intercepted at Washington in orchid debris from Colombia; in New Jersey on *Cattleya* sp. from Colombia and Venezuela.

19. *Orthaea pallicornis* (Dallas)

Intercepted in California on *Vanda sanderiana* from the Philippines.

20. *Orthaea vicinalis* (Distant)

Intercepted at Washington on *Cattleya* sp. from Colombia.

21. *Cryphula affinis* (Wolff)

Intercepted at Washington, D.C., on *Cattleya* from Mexico.

22. *Cryphula apicatus* (Distant)

Intercepted in California on orchid from Mexico; in New Jersey on *Cattleya* sp. from Venezuela.

23. *Cryphula fasciatus* (Distant)

Intercepted in New Jersey on *Cattleya* sp. from Colombia.

24. *Antilocoris delineata* (Walker)

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia.

25. *Antilocoris picturata* (Blanchard)

Intercepted in California on *Cattleya skinneri* and *Oncidium splendidum* from Guatemala.

26. *Xestocoris collinus* (Distant)

Intercepted at Honolulu on *Stanhopea* from Canal Zone; at Washington, D.C., on *Oncidium* sp. from Guatemala; in New Jersey on *Cattleya bowringiana* from Guatemala.

27. *Ligyrocoris abdominalis* (Guerin)

Intercepted at Washington, D.C., on orchid from Guatemala.

28. *Ligyrocoris aurivilliana* (Distant)

Intercepted in Texas on orchid from Mexico.

29. *Ligyrocoris nitidicollis* (Stål)

Intercepted in Texas on orchid from Mexico.

30. **Ligyrocoris oblitus** Distant

Intercepted at Washington, D.C., on *Oncidium* sp. from Guatemala.

31. **Prytanus globosus** Distant

Intercepted in California on *Cattleya trianaei* from Colombia.

32. **Neocattarus vegetus** Distant

Intercepted at Washington, D.C., on orchid from Honduras; in Texas on orchid from Mexico.

33. **Exptochiomera minima** (Guer.)

Intercepted in California on *Laelia* sp. from Mexico.

34. **Exptochiomera formosa** (Distant)

Intercepted at Washington, D.C., on *Cattleya* sp. from Venezuela.

35. **Exptochiomera oblonga** (Stål)

Intercepted in New Jersey on *Cattleya* sp. from Venezuela.

36. **Exptochiomera tumens** (Stål)

Intercepted in New Jersey on *Cattleya* sp. from Venezuela.

37. **Melanocoryphus vittiscutis** (Stål)

Intercepted in Texas with orchid from Guatemala. Intercepted at Washington, D.C., in orchid packing from Guatemala.

38. **Myodocha intermedia** Distant

Intercepted in Texas on *Cattleya skinneri* from Mexico.

39. **Myodocha unispinosa** Stål

Intercepted in Texas on orchid from Mexico.

PYRRHOCORIDAE

40. **Gonatas typicus** Distant

Intercepted in New Jersey on *Cattleya* sp. from Colombia.

TINGITIDAE

41. **Phatnoma varians** Drake

Intercepted in California on *Cattleya schroederiana* from Colombia.

42. **Phatnoma annulipes** Champion

Intercepted at Washington, D.C., in orchid packing from Venezuela.

43. *Monanthia monotropidia* Champion

Intercepted in Texas on orchid from Mexico.

44. *Leptobyrsa plicata* Champion

Intercepted at Washington, D.C., on *Cattleya dowiana aurea* from Costa Rica.

ARADIDAE

45. *Neuroctenus litigiosus* (Stål)

Intercepted in Texas on orchid from Guatemala.

MIRIDAE

46. *Eurycipitia splendens* (Distant)

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia.

47. *Neella floridula* (Distant)

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia, and on *Epidendrum aromaticum* from Nicaragua.

48. *Fulvius quadristillatus* (Stål)

Intercepted at Washington, D.C., on orchid from Colombia; in New Jersey on *Cattleya* sp. from Colombia; in California on orchid from Brazil.

49. *Phytocoris militaris* Westwood

Has been reported on *Dendrobium* and *Phalaenopsis* in Java. (Possibly a synonym of *Tenthecoris bicolor*.)

A few other bugs have been similarly reported but without specific determination.

HOMOPTERA

APHIDIDAE

1. *Cerataphis lataniae* (Boisduval)

Coccus lataniae Boisd., Ent. Hort., 1867.

Cerataphis lataniae, Swain, Univ. Cal. Pub. Ent., 3: 140, 1919.

This peculiar aphid commonly infests orchids, but has other host plants besides as palms and ferns. It is known in Honolulu, and has been found on orchids in greenhouses. It has widespread distribution, occurring on several orchids, and has been frequently intercepted at Honolulu on imported orchids. Intercepted in California on orchids from New Jersey, Guatemala, Brazil, Belgium, England and Manila. The immature aphids resemble aleurodids, being black and oval in shape, with a white waxy fringe. They locate on either surface of the leaves and suck the sap. Vanilla plantations are attacked in Reunion.

2. *Macrosiphum luteum* (Buckton)

Siphonophora lutea Buckton, British Aphides: 119, pl. 8, 1876.

Macrosiphum luteum, Bates, Bol. Agric. y Caminos, Guatemala, 10 (3): 101-104, 3 figs., 1931.

This aphid was described in England from several kinds of orchids in hothouses. It has been intercepted many times at mainland stations on orchids from Central and South America. Intercepted at Washington, D.C., on orchid from England, on orchid from Bolivia, on *Oncidium sphacelatum* from Costa Rica, on *Cattleya aurantiaca* and *Lycaste* sp. from Guatemala, on orchid from Mexico; at Honolulu on *Oncidium sphacelatum* from Guatemala; in California on *Lycaste skinneri*, *Oncidium sphacelatum*, *Brassia verrucosa*, *Epidendrum vitellium*, *Oncidium cavendishianum*, *Cattleya skinneri*, *C. bowringiana* and *Epidendrum stamfordianum* from Guatemala, on *Oncidium bicallosum*, *Laelia anceps*, *Odontoglossum citrosum*, *Epidendrum* sp., *Laelia autumnalis albiflora* and *Catasetum* sp. from Mexico; in Texas on orchid from Mexico and on orchid from Costa Rica; in Puerto Rico and Florida on orchid from Venezuela; in New York on *Cattleya mossiae* var. from Venezuela.

3. *Aphis gossypii* Glover

The cotton aphid sometimes infests the flowers of orchids in Honolulu.

4. *Macrosiphum orchidacearum* van der Goot

5. *Macrosiphum polystachyae* van der Goot

Franssen en Tiggelovend, Insects and diseases of orchids in Java: 19, 1935.

These two aphids occur on *Dendrobium* spp. in Java. Colonies of them infest the flower stalk and buds. I have seen no other record of their occurrence.

ALEURODIDAE

1. *Dialeurodes citri* (Riley & Howard)

Aleyrodes citri R. & H., Insect Life, 5: 219, figs. 23, 24, 1893.

Dialeurodes citri, Cockerell, Proc. Ac. Sci. Phila., 1902: 283.

Has been intercepted at Washington, D.C., on *Oncidium carthaginiense* from Costa Rica.

2. *Aleurodicus guppyi* Quaintance & Baker

U. S. D. A. Ent., Tech. Ser. 27 (1): 59, 1913.

Described from Trinidad. Not an orchid insect, but has been reported as intercepted on orchids from Central and South Amer-

ica. Intercepted at Washington, D.C., on orchids from Mexico and Guatemala.

PSYLLIDAE

Trioza litseae Giard

This is a psyllid which has been reported on orchids in Reunion, destroying the fruit. It occurs also on laurel.

MEMBRACIDAE

1. **Trachytalis isabellina** Fowler

Intercepted in California on orchid from Mexico, on *Lycaste skinneri* from Guatemala.

2. **Aphetea inconspicua** Fowler

Intercepted in California on orchid from Mexico.

COCCIDAE (Scale Insects)

LIST OF SCALE INSECTS FOR WHICH ORCHIDS ARE
THE SOLE OR CHIEF FOOD PLANT

I have listed here twenty-nine species of scale insects for which orchids of one species or another are their favorite food plants, or in some cases probably their exclusive food plants. Quite a number of the species, as their specific names indicate, were named and described from orchids, and for which no other food plant has been recorded. In a few cases, there is no record except the initial one which happened to be an orchid. For some of these, perhaps additional observations may indicate other food plants. Of this list, six have been recorded on orchids in Hawaii at one time or another, though they may not all be permanently established. These include the following:

Coccus pseudoesperidum, *Diaspis boisduvalii*, *Furcaspis biformis*, *Parlatoria pseudaspidotus*, *Parlatoria proteus*, *Leucaspis cockerelli*.

1. **Conchaspis angraeci** Cockerell

Jour. Inst. Jamaica, 1: 256, 1893.

Described from a Madagascar orchid, *Angraecum eburneum* var. *virens*, at Hope Gardens, Jamaica. Also recorded in England on *Rodriguezia secunda*, on freshly imported plants from Trinidad.

At Washington, D.C., it has been intercepted on *Oncidium ampliatum* from Colombia, on *Oncidium* sp. from Mexico, on *Gongora maculata* and *Epidendrum elongatum* from Trinidad, on *Lockhartia pallida* from Canal Zone, on *Cattleya* sp. from Venezuela. Intercepted in California on orchid from Nicaragua, on *Epidendrum*

hunterianum, *E. rousseanae*, *Lockhartia lumifera*, *Oncidium stipitatum* and *Oncidium ampliatum* from Canal Zone. Intercepted at Honolulu on *Laelia* sp. and *Oncidium* sp. from Canal Zone. Intercepted at Puerto Rico on *Vanilla* from Ecuador. Intercepted in New Jersey on *Cattleya* sp. and *Oncidium* sp. from Brazil.

2. *Asterolecanium aureum* (Boisduval)

Coccus aureus Boisd., Insectologie Agricole, 2: 301, 1868.

Asterolecanium aureum, Targ., Ann. Soc. Ent. France, (4) 10: 277, 1870.

In Europe, on imported orchids from the West Indies: *Calathea vittata* and *Oncidium*.

Intercepted at Washington, D.C., on *Cattleya* sp. from Colombia, on *C. guttata* from Brazil, on *Oncidium* sp. from Trinidad, on *Oncidium lucidum* from Jamaica, on *Angraecum eburneum* from British Guiana, on *Brassia caudata*, and *Epidendrum* sp. from Dominican Republic, on *Gongora atropurpurea* from Trinidad, on orchid from Venezuela, on *Brassavola nodosa* and *Oncidium* sp. from Costa Rica and Dominican Republic, on *Cattleya dowiana* and *Oncidium kramerianum major* from Costa Rica, on *Brassia* sp. from Dominican Republic, on *Laelia albida sulphurea* from Mexico, on *Epidendrum* sp. from Guatemala and Haiti. Intercepted in California on *Epidendrum* sp. from Guatemala, on *Cattleya labiata* from Brazil, on *C. trianaei* from Colombia, on *Oncidium kramerianum* from Costa Rica, on *Oncidium tigrinum* from Mexico, on *Oncidium* sp. from Trinidad. Intercepted at Honolulu on *Epidendrum truncatum* from Dominican Republic and *Gongora maculata* from Canal Zone. Intercepted at Puerto Rico on orchid from Venezuela. Intercepted in New Jersey on *Cattleya dowiana*, *Epidendrum ciliare* and *Trichopilia* sp. from Costa Rica.

3. *Asterolecanium epidendri* (Bouché)

Lecanium epidendri Bouché, Stett. Ent. Zeit., 5: 300, 1844.

Asterolecanium epidendri, Ckll., Proc. Acad. Nat. Sci. Phila.: 269, 1899.

Described in Germany on *Epidendrum cuspidatum* from the West Indies. It also infests *Oncidium tetrapetalum* and *Broughtonia sanguinea* in Jamaica, and *Angraecum sesquipedale*.

It has been intercepted in California on *Brassia gireoudiana*, *Cattleya dowiana* and *Gongora armeniaca* from Costa Rica, on *Cattleya luddemanniana* from Venezuela, on *Laelia superbiana* from Guatemala, on *Odontoglossum grande* from Salvador, on *Cattleya* sp. from Brazil and Colombia; in New Jersey on *Brassia gireoudiana* and *Epidendrum ciliare* from Costa Rica, on *Cattleya* sp. from Brazil, Venezuela, Colombia and Costa Rica.

4. **Lecaniodiaspis dendrobii** (Douglas)

Prosopophora dendrobii Dougl., Ent. Mo. Mag., 28: 207, 1892.

Lecaniodiaspis dendrobii, Ckl., Check List: 237, 1896.

Described from Demerara on *Dendrobium calceolaria*. It has been intercepted at Washington, D.C., on orchid from Venezuela; and at California on *Laelia rubescens* from Guatemala, and *Cattleya* sp. from Colombia; at New Jersey on *Cattleya* sp. from Venezuela.

5. **Pseudococcus orchidicola** Takahashi

Takahashi, Tenthredo, 2 (3): 242, fig. 3, 1939.

Described from Rota, Mariana Islands, on an orchid. No other records found.

6. **Vinsonia stellifera** (Westwood)

Coccus stellifer Westw., Proc. Ent. Soc., London, 1871: iii.

Vinsonia stellifera, Sign., Ent. Mo. Mag., 25: 152, 1888.

Described from *Cypripedium niveum* from Siam. It occurs also on *Broughtonia sanguinea* and on ferns, coconut, guava and other plants, and has been recorded from Ceylon, West Indies, South America, Central America and California.

Intercepted at Washington, D.C., on *Epidendrum atropurpureum* from Colombia, on *Stanhopea insignis* from Brazil, on *Laelia* sp. and *Oncidium* sp. from Canal Zone, on *Brassia caudata*, *Lycaste costata*, *Oncidium* sp. from Dominican Republic, on *Epidendrum coccineum* from Jamaica, on *Bifrenaria aurantiaca*, *Epidendrum oncidoides*, *Gongora maculata*, *Oncidium papilio* and *Stanhopea grandiflora* from Trinidad, on *Epidendrum* sp. and *Lycaste costata* from Dominican Republic, on *Broughtonia sanguinea*, *Epidendrum fragrans* and *Phaius grandifolius* from Jamaica, on *Brassia verrucosa*, *Stanhopea* sp. and *Epidendrum atropurpureum* from Panama, on *Spathoglottis* sp. from Ceylon, on *Oncidium kramerianum* from Canal Zone, on *Brassia* sp. from Dominican Republic, on *Oncidium* sp. from Guadeloupe, on *Catasetum* sp. from Venezuela. Intercepted in California on *Eria floribunda* from Borneo, on *Cattleya forbesi* from Dominican Republic, on *Aspasia* sp. from Panama, on *Lycaste* sp. from South America, on *Phalaenopsis amabilis* and *P. grandiflora* from Straits Settlements, on *Peristeria alata*, *Brassavola* sp., *Brassia* sp., *Cattleya* sp. and *Stanhopea bucephalus* from Canal Zone, on *Cypripedium philippinense* from Thailand, and on orchids from Mexico. Intercepted at Honolulu on *Epidendrum stanfordianum* from Canal Zone, on *Oncidium papilio* from British West Indies. Intercepted at Puerto Rico on orchid from the Virgin Islands, on orchid from Venezuela. Intercepted in Florida on *Oncidium altissimum* from the Virgin Islands.

7. **Lecanium angraeci** (Boisduval)

Chermes angraeci Boisduv., Ent. Hort.: 337, 1867.

Lecanium angraeci, Sign., Ann. Soc. Ent. France, (5) 6: 609, 1876.

Found on *Angraecum sesquipedale* from Madagascar. No other record of locality.

8. *Coccus pseudohesperidum* (Cockerell)

Lecanium pseudohesperidum Ckll., Am. Nat., 29: 380, 1895.

Coccus pseudohesperidum, Weiss, Psyche, 23: 23, 1916.

Described from *Cattleya* in greenhouse in Canada. It occurs in greenhouses in New Jersey. At Honolulu, it has been intercepted a number of times on *Cattleya* sp. from New Jersey. Some orchid houses in Honolulu have had infestations of this scale, which is very injurious. Intercepted in California on orchids from Belgium.

9. *Leucaspis cockerelli* (de Charmoy)

Fiorinia cockerelli de Charmoy, Pr. Soc. Amic. Scien.: 33, 1899.

Leucaspis cockerelli, Fullaway, Proc. Haw. Ent. Soc., 10: 46, 1938.

Recorded on orchids in Honolulu and Hilo in 1933. Intercepted in California on *Dendrobium thyrsiflorum* from Costa Rica, on *Epidendrum* sp. from Honduras. Intercepted at Washington, D.C., on *Vanda teres* from Jamaica, on *Epidendrum atropurpureum* and *Odontoglossum* sp. from Dominican Republic. Intercepted at Honolulu on *Spathoglottis* sp. from Fiji, on *Vanda luzonica* from Philippines. Intercepted in New Jersey on *Vanda teres* from Jamaica.

10. *Diaspis boisduvalii* Signoret

Ann. Soc. Ent. France, (4) 9: 432, 1869.

This scale occurs on orchids in many regions of the world. Its original habitat is uncertain. It occurs on some other plants also, as palms and hothouse plants. It has often been intercepted in shipments of imported orchids in California and Hawaii. It has been reported established in Hawaii, Australia, New Zealand, Canada, the eastern states, U.S.A., Mexico, Brazil, West Indies, Europe (in hothouses). No doubt, this is the scale recorded as *Diaspis* sp. in many interception records on orchids.

11. *Diaspis cattleyae* (Cockerell)

Aulacaspis cattleyae Ckll., Biol. Centr.-Amer. 2 (2): 30, 1899.

Diaspis cattleyae, Ckll., The Entomologist, 35: 59, 1902.

As the name indicates, this scale was described from *Cattleya*. The specimens were on the leaves of a plant from Mexico, intercepted in California. Intercepted in Pennsylvania on *Odontoglossum* sp. from Mexico. It has also been intercepted in California on orchids from England. Intercepted at Honolulu on orchids from New Jersey.

12. **Phenacaspis dendrobii** Kuwana

Dobuts. Zasshi, Tokyo, 43: 657, figs., 1931.

Described on orchids entering Japan from Hong Kong. Intercepted at Honolulu on *Dendrobium draconis* from the Philippines.

13. **Pinnaspis townsendi** (Cockerell)

Diaspis townsendi Ckll., Biol. Centr.-Amer., 2 (2): 28, 1899.

Hemichionaspis townsendi, Fullaway, Proc. Haw. Ent. Soc., 10: 46, 1938.

Pinnaspis townsendi, U.S.D.A., List of Interceptions, 1941-42: 20, 1943.

Described from Mexico, on *Prosopis*. Listed by Fullaway as an orchid scale, often intercepted at Honolulu on orchids from the Philippines. Intercepted at Washington, D.C., on *Dendrobium* sp., *Vanda coerulea* and *Vanda* sp. from Siam, on *Rhynchostylis retusa* from Java. Intercepted at California on *Vanda* sp. from Guadeloupe and *Dendrobium phalaenopsis* from Sumatra. Intercepted at Honolulu on *Aerides falcatum*, *Aerides odoratum* and *Vanda roxburghi* from Thailand, on *Aerides lawrenciae*, *Aerides quinquevulnera*, *Aerides odoratum*, *Dendrobium moschatum*, *Renanthera storiei*, *Trichoglottis brachiata*, *Vanda luzonica*, *Vanda merrilli*, *Vanda tricolor*, *Dendrobium victoria-regina*, *Dendrobium aureum* and *Phalaenopsis amabilis rimestadiana* from the Philippines, on *Cymbidium* sp. from Japan, on *Vanda suavis* and *Aerides* sp. from Java.

14. **Aspidiotus cymbidii** Bouché

Stett. Ent. Zeit., 5: 296, 1844.

Described from *Cymbidium chinense* in greenhouses in Germany. No other record available.

15. **Aspidiotus australiensis** Kuwana

Dobuts. Zasshi, 43: 658, 1931.

Described from specimens intercepted in Japan on orchid from Thursday Island. I have found no other record.

16. **Aspidiotus biprominens** Kuwana

Dobuts. Zasshi, 43: 658, 1931.

Described from specimens intercepted in Japan on orchid from Java. No other records.

17. **Aspidiotus chinensis** Kuwana & Muramatsu

Journal Plant Prot., Tokyo, 18: 335, 1931.

Described from *Cymbidium faberi* intercepted in Japan from China. No other records.

18. **Hemiberlesia mendax** McKenzie

Bull. Dept. Agr. Calif., 32: 152, fig. 5, 1943.

Described from orchids from Guatemala intercepted in quarantine in California.

19. **Melanaspis aliena** (Newstead)

Aspidiotus alienus Newst., Ent. Mo. Mag., 37: 81, 1901.

Melanaspis aliena, U.S.D.A. Bur. Ent. and Plant Quar., List of Interceptions 1941-42: 17, 1943.

Described from *Cattleya skinneri*, under glass, London. It has been intercepted in California on *Cattleya bowringiana*, *C. skinneri*, *Oncidium altissimum* from Guatemala, on *Cattleya skinneri* from Costa Rica, on *Epidendrum radicans* and *E. macrocarpum* from Canal Zone, on *Brassavola glauca* from Mexico and on orchids from London. Intercepted in New Jersey on *Cattleya skinneri alba* from Costa Rica and *Odontoglossum* sp. from Mexico.

20. **Chrysomphalus odontoglossi** (Cockerell)

Aspidiotus bififormis var. *odontoglossi* Ckll., Gard. Chron., (3) 13: 548, 1893.

Chrysomphalus odontoglossi, Fernald, Cat. Coccidae: 291, 1903.

On *Odontoglossum grande* in Jamaica. I found no record of other localities.

21. **Chrysomphalus nulliporus** McKenzie

Microentomology, 4: 76, fig. 35, 1939.

Described from *Dendrobium lyonii* from the Philippines, intercepted at San Francisco. It has also been intercepted at Honolulu on the same orchid from the Philippines. I have found no other record of this scale.

22. **Furcaspis bififormis** (Cockerell)

Aspidiotus bififormis Ckll., Gardener's Chronicle, (3) 13: 548, 1893.

Furcaspis bififormis, Lindinger, Berlin, Ent. Zeit., 52: 99 (1907) 1908.

Described from Jamaica; also occurs in Trinidad, Antigua, Grenada and Central America. It has been found established in New Jersey greenhouses on orchids from Brazil and Venezuela. It has been intercepted in California on orchids from Chile and at Honolulu on orchids from New Jersey.

Intercepted at Washington, D.C., on *Cattleya superba* from British Guiana, on *Cattleya gigas*, *Oncidium luridum* and *Phaius* sp. from Jamaica, on *Cattleya* sp. from Venezuela, on *Brassia caudata*, *Epidendrum* sp., *Oncidium* sp., from Dominican Republic, on *Brassavola nodosa* and *Schomburgkia* sp. from Jamaica, on

Cattleya labiata, *C. mossiae*, *Epidendrum osmanthum*, *Oncidium altissimum* and *Schomburgkia lyonsii* from British Guiana, on *Oncidium* sp. from Costa Rica, on *Cattleya mantinii-nobilior* from Dominican Republic, on *Epidendrum atropurpureum* and *Oncidium* sp. from Panama and the Canal Zone, on *Epidendrum atropurpureum* from Costa Rica, on *Cattleya* sp. from Colombia, on *Cattleya* sp., *Oncidium sprucei* and *Schomburgkia crispa* from Trinidad, on *Oncidium* sp. from Guadeloupe.

Intercepted at Honolulu on *Oncidium panamense* and *Epidendrum* sp. from the Canal Zone, on *Epidendrum atropurpureum* from Panama, on *Epidendrum* sp. from Venezuela, on *Dendrobium* sp. from Burma, on *Oncidium luridum intermedium* from Dominican Republic, and on orchids from New Jersey and Manila.

Intercepted in California on orchid from the Dutch East Indies, on *Epidendrum atropurpureum* from Panama, on *Cattleya trianaei* from the Canal Zone and Colombia, on *Odontoglossum* sp. and *Oncidium panamense* from Panama, on *Oncidium sphacelatum*, from Straits Settlements, on *Oncidium confusum* from the Canal Zone, on *Cattleya gigas* and *Rodriguezia secunda* from Colombia, on orchids from Chile, on *Cattleya aurea*, *C. skinneri* and *C. trianaei* from Guatemala, on *Oncidium lanceanum* from Trinidad, on *Cattleya superba* from British West Indies, on *Laelia* sp. from Mexico, on *Cymbidium lowiana* from India.

Intercepted at Puerto Rico on *Oncidium carthaginense* from Dominican Republic, on orchid from Venezuela, on *Cattleya* sp. from Venezuela. Intercepted at New York on *Cattleya percivaliana* from Venezuela. Intercepted in New Jersey on *Brassavola nodosa*, *Brassia caudata*, *Epidendrum atropurpureum* from Canal Zone, on *Cattleya* sp., *Oncidium* sp., *Schomburgkia* sp. from Venezuela.

23. *Furcaspis biformis* var. *cattleyae* (Cockerell)

Aspidiotus biformis var. *cattleyae* Ckll., Gardener's Chronicle, (3) 13: 548, 1893.

Described from Jamaica on *Cattleya bowringiana*. Intercepted in California on orchid from Jamaica.

24. *Lepidosaphes cymbidicola* Kuwana

Imp. Plant Quar. Serv. Tech. Bull. 2: 27, pl. 8, figs. f-j, 1925.

Described from orchids in greenhouses in Yokohama and Kobe, Japan. Also intercepted in Japan on orchids from Formosa and China. Intercepted at Honolulu on *Cymbidium sinense* from Japan and on *C. powelli* from New Jersey.

25. *Lepidosaphes pinnaeformis* (Bouché)

Aspidiotus pinnaeformis Bouché, Stett. Ent. Zeit., 12: 111, 1851.

Lepidosaphes pinnaeformis, Fernald, Cat. Coccidae: 313, 1903.

Described from the East Indies, on leaves of *Cymbidium olei-*

folium. Has been recorded on *Cymbidium pendulum* at the Kew Gardens.

26. Lepidosaphes tuberculata Malenotti

Redia, 12: 183, pl. 1, figs. 1-5, 1916.

Described in Italy from *Cymbidium tracyanum*. Has also been recorded in England on *Cymbidium* sp. Green suggests the likelihood of *tuberculata* being a synonym of *pinnaeformis*. Has been intercepted at Honolulu, and in California and New Jersey on *Cymbidium* sp. from England.

Intercepted at Washington, D.C., on *Cymbidium devonianum*, *C. erica*, *C. castor aureum*, *C. alexanderi*, *C. steffi* and *C. miranda* from England, on *Cymbidium* sp. from Dutch Guiana, on *Cymbidium pauwelsii* from Belgium, on *Cymbidium lowianum* from India. Intercepted at California on *Cymbidium* sp. from England and Japan, on *Cymbidium tracyanum* and *C. insigne* from Australia. Intercepted at Washington on *Cymbidium* sp. and on *Cymbidium gyrokuchen* from Japan. Intercepted at Honolulu on *Cymbidium lowianum* from Australia and *Cymbidium sinense* from Japan. Intercepted in New Jersey on *Cymbidium eburneum* from England.

27. Lepidosaphes mackieana McKenzie

Bull. Dept. Agric. Calif., 32: 153, fig. 6, 1943.

Described from *Dendrobium merlin* in orchid houses in California. It is known in orchid houses in New Jersey, and also is established in orchid houses in Honolulu. It has been intercepted in quarantine at Honolulu on *Dendrobium superbum dearei* from New Jersey; in California on *Dendrobium* sp. from Hawaii and New Jersey.

28. Parlatoria proteus (Curtis)

Aspidiotus proteus Curtis, Gardener's Chronicle, No. 39, 1843: 676.

Parlatoria proteus, Sign., Ann. Soc. Ent. France (4) 9: 450, 1869.

Described from scales on *Aloe* and *Amaryllis*. It is recorded on many other kinds of plants including orchids, and widely spread including Europe, Australia, China, Japan, Formosa, Hawaii, Brazil and the United States. Has been intercepted in California on orchids from the Orient. It has been intercepted at Honolulu, on orchids from the Philippines. It occurs on orchids in greenhouses in the eastern States, and has been recorded from Hawaii.

29. Parlatoria pseudaspidiotus Lindinger

Insekten Börse, 23: 131, 1905.

Described from Singapore on orchids. Also recorded in India.

Intercepted at Honolulu on *Vanda joaquimae* from Australia, on *Trichoglottis philippinensis*, *Vanda teres*, *V. hookeriana*, *Vanda teres alba*, *Vanda joaquimae* and several other orchids from the Philippines, on *Vanda* sp. from Java and Sumatra, on *Vanda teres andersoni* and *Vanda teres grandiflora* from Japan, on *Vanda cooperi* and *V. hookeriana* from Straits Settlements. Intercepted in California on *Vanda teres*, *V. joaquimae*, *V. lamellata* and *V. hookeriana* from the Philippines, on *Vanda* sp. from Straits Settlements, on *Vanda* sp. from Thailand, on *Vanda teres* from India. Intercepted at Washington, D.C., on *Vanda teres andersoni* and *Vanda teres aurorea* from India, on *Vanda teres* from Ceylon, on *Vanda teres* from Straits Settlements and from England, on *Vanda* sp. from Java, on *Dendrobium* sp. from Sumatra. It has been reported as occurring in Honolulu.

LIST OF SCALE INSECTS HAVING DIVERSE FOOD PLANTS, INCLUDING ORCHIDS

This long list of 78 species was chiefly obtained from the reports of the U. S. Bureau of Entomology and Plant Quarantine on insects found on imported orchids from various parts of the world. It includes species which have many food plants (polyphagous), and their occurrence on orchids might be considered casual, incidental or accidental. It may be that these imported orchids have been held for a time at the source, in plant houses associated with other kinds of plants from which they became infested. As no special study has been made on the occurrence of scales on orchids in their natural habitat, information on this point is very uncertain, and it is only a conjecture on my part that the orchids have become infested after having been brought in from the wild. Many of the species of this list are now so widely spread that it is not always certain what was their original home.

Many of the records of scale insects intercepted on orchids give the determinations only to the genus, as: *Aspidiotus* sp., *Saissetia* sp., *Pseudococcus* sp., and *Diaspis* sp. In these cases, no doubt, the scale insects really were of the same species of the respective genera which have been recorded as intercepted on orchids from the same regions at other times.

1. *Icerya seychellarum* (Westwood)

Intercepted in California on orchids from Tahiti.

2. *Icerya montserratensis* Riley & Howard

Intercepted at Washington, D.C., on orchid from Colombia.

3. *Puto mexicanus* (Cockerell)

Intercepted in California on *Laelia anceps*, *Odontoglossum citrosimum*, *Oncidium* sp. and *Stanhopea* sp. from Mexico.

4. **Puto yuccae** (Coquillett)

Intercepted in California on *Oncidium* sp. from Mexico.

5. **Asterolecanium pustulans** (Ckll.)

Widely distributed in American Tropics. Occurs also in Hawaii, especially on fig and oleander. Reported as common on leaves of orchids in British Guiana.

6. **Ceroputo barberi** (Cockerell)

Intercepted at Honolulu on orchids from India.

7. **Ceroputo** sp.

Intercepted in California on orchids from Central America. Intercepted at Honolulu on *Oncidium papilio majus* from Trinidad.

8. **Pseudococcus brevipes** (Ckll.)

This is the notorious pineapple mealybug. It occurs on many other plants and is widely distributed in tropical regions. It is reported as an orchid pest in Java: on *Phalaenopsis amabilis*, *Dendrobium crumenatum* and *Vanda dearei*. Intercepted at Honolulu on *Phalaenopsis amabilis* from the Philippines.

9. **Pseudococcus citri** (Risso)

Another widely distributed polyphagous mealybug. Reported on the following orchids in Java: *Dendrobium crumenatum*, *D. phalaenopsis* and *D. veratrifolium*.

10. **Pseudococcus crotonis** Green

Intercepted in California on orchids from the Philippines.

11. **Pseudococcus glaucus** (Maskell)

Described in New Zealand, on several plants, including orchids in greenhouses.

12. **Pseudococcus kraunhiae** (Kuwana)

Intercepted in California on orchid from Hawaii.

13. **Pseudococcus longispinus** (Targioni)

Reported on orchids in Honolulu. Intercepted in California on orchids from Manila and Guatemala.

14. **Pseudococcus liliacinus** Cockerell

Intercepted in California on *Phalaenopsis amabilis* and *P. rimestadtiana* from the Philippines, on *Phalaenopsis amabilis* from Sumatra. Intercepted at Honolulu on *Vanda coerulea* and *Phalaenopsis amabilis* from Sumatra, on *Vanda sanderiana*, *Aerides quinquevulnera*, and several other orchids from the Philippines.

15. **Pseudococcus maritimus** (Ehrhorn)

Intercepted at Honolulu on orchids from California, New Jersey, New York, and from India.

16. **Pseudococcus nipae** (Maskell)

Intercepted in New Jersey on *Odontoglossum* sp. from Costa Rica.

17. **Ferrisia virgata** (Cockerell)

Intercepted at Honolulu on *Dendrobium crumenatum* and several other orchids from the Philippines and on orchids from Singapore. Intercepted in California on *Phalaenopsis amabilis* from the Philippines. Intercepted at Washington on several kinds of orchids from the Philippines. Intercepted in New York on *Cattleya trianaei* from Colombia. Reported on *Dendrobium crumenatum* in Java.

18. **Pulvinaria floccifera** (Westw.)

The camellia scale has been reported on orchids in England: on *Oncidium papilio* and *Calanthe natalensis* in greenhouses. Intercepted at Washington, D.C., on *Dendrobium nobile-virginale* and *Odontonia olga* from England. Intercepted in New Jersey on *Cymbidium* sp. from England.

19. **Ctenochiton elongatus** Maskell

Described in New Zealand on *Geniostoma* and has also been found on an orchid (*Dendrobium*) in New Zealand.

20. **Eucalymnatus perforatus** (Newstead)

Described from a palm in greenhouse in England. Intercepted in California on orchids from New Jersey, New York, and England.

21. **Eucalymnatus tessellatus** (Signoret)

Has been intercepted a number of times in California on orchids from New York and New Jersey.

22. **Lecanium aequale** Newstead

Described from British Guiana, but not on orchids. Reported in 1924 as occurring on orchids in Honolulu.

23. **Lecanium elongatum** Signoret

Described from France. Sometimes on *Dendrobium*.

24. **Coccus acuminatus** (Sign.)

Sometimes found on orchids in greenhouses in France. Has been intercepted in California on orchids from Hawaii.

25. **Coccus hesperidum** Linnaeus

Has been recorded on orchids in greenhouses in New Jersey.

Has also been reported on orchids in Hawaii. It has been intercepted in California on orchids from New Jersey, New York, Guatemala, England and Belgium.

26. *Coccus capparidis* (Green)

Described in Ceylon from *Capparis*. Recorded from orchids in Hawaii. Intercepted in California on *Cypripedium villosum* and *C. fairieanum* from India.

27. *Coccus viridis* (Green)

Intercepted in California on *Cattleya* sp. from Panama.

28. *Coccus longulus* (Douglas)

Intercepted in California on orchids from New Jersey.

29. *Saissetia filicum* (Boisduval)

As the name indicates, this scale was described from ferns. It was once intercepted at Honolulu on orchids from New Jersey.

30. *Saissetia hemisphaerica* (Targ.)

Occasionally occurs on orchids in Hawaii; also reported on orchids in California. Found on leaf of a ground orchid in New Caledonia by F. X. Williams. Intercepted in California on orchids from Mexico, New Jersey, New York and Manila. Intercepted at Honolulu on orchids from Manila.

31. *Saissetia hemisphaerica hibernaculorum* (Boisduval)

Occurs on many plants including greenhouse plants. Recorded on *Phaius* in Europe.

32. *Saissetia oleae* (Bernstein)

Intercepted in California on orchids from Manila.

33. *Diaspis echinocacti* (Bouché)

Intercepted in California on orchids from South America, and from Massachusetts.

34. *Chionaspis graminis* Green

Described from lemon-grass in Ceylon. It occurs on the leaves of *Dendrobium crumenatum* growing wild in Java.

35. *Hemichionaspis minor* (Maskell)

Intercepted in California on orchids from Panama.

36. *Pinnaspis aspidistrae* (Sign.)

Intercepted in California on orchids from New York and also from England. Has been recorded on orchids in Hawaii. Intercepted at Honolulu on orchids from Australia.

37. *Pinnaspis buxi* (Bouché)

Is mostly a palm pest, but has been recorded on orchids in Hawaii. Intercepted in California on orchid from Dominican Republic.

38. *Fiorinia floriniae* (Targioni)

Mostly a palm pest, but has been recorded on orchids in New Jersey greenhouses. Intercepted at Honolulu on orchids from Java.

39. *Fiorinia stricta* Maskell

Described in New Zealand on *Dendrobium*, and also other plants.

40. *Aspidiotus britannicus* Newstead

Described on holly in England. Has been intercepted in California on orchids from New York.

41. *Aspidiotus cyanophylli* Sign.

Reported on orchids, palms and ferns in New Jersey greenhouses. Has been intercepted in California on orchids from New Jersey, New York and Mexico, and intercepted at Honolulu on orchids from Panama and New Jersey.

42. *Aspidiotus destructor* Sign.

This is the devastating coconut pest in some Pacific regions. It has been intercepted at Honolulu on orchids from the Philippines.

43. *Aspidiotus diffinis* Newstead

Described from Demerara. Host plant not known. Intercepted at Honolulu on *Oncidium pusillum* from Canal Zone. Intercepted at Washington, D.C. on *Cattleya gigas sanderiana* from Colombia.

44. *Aspidiotus hederæ* (Vallot)

The oleander scale. It has a very extensive distribution and a very wide range of food plants. Has been reported on orchids in New Jersey and California greenhouses. Has been intercepted in California on orchids from Rhode Island and New Jersey.

45. *Aspidiotus excisus* Green

Intercepted at California on *Cypripedium suavissimum* from India.

46. *Aspidiotus latastei* Cockerell

Intercepted at Washington, D.C. on orchid from Brazil.

47. *Aspidiotus coloratus* Cockerell

Described from New Mexico on *Chilopsis*. Reported on *Cattleya citrina*.

48. **Aspidiotus lataniae** Signoret

Intercepted in California on orchids from Brazil; at Honolulu on orchids from the Philippines.

49. **Aspidiotus palmae** Morgan

Described from Jamaica on coconut leaves. Fullaway has listed it among scales occurring on orchids. Intercepted at Washington, D.C., on *Stanhopea* sp. from Colombia.

50. **Aspidiotus spinosus** Comstock

Described from *Camellia* in Washington greenhouse. Listed by Fullaway among scales occurring on orchids. Intercepted in California on *Dendrobium superbum* from the Philippines. Intercepted at Washington, D.C., on *Lycaste* sp. from Colombia.

51. **Morganella longispina** (Morgan)

Described from Demerara, on *Cupania sapida*. Has been intercepted in California on *Dendrobium spectabile* from Australia; and on *Grammatophyllum speciosum* from the Philippines.

52. **Pseudaonidia curculiginis** Green

Described from Java on an amaryllid. Has been intercepted in California on orchids from the Philippines. Intercepted at Honolulu on *Vanda teres* and *Grammatophyllum speciosum* from the Philippines. Intercepted at Washington, D.C. on *Cymbidium finlaysonianum* from the Philippines.

53. **Pseudaonidia tesserata** (de Charmoy)

Intercepted at Honolulu on *Vanda suavis* from Australia. Intercepted at Washington, D.C. on *Cattleya* sp. from Colombia; in California on orchid from Nicaragua.

54. **Pseudaonidia clavigera** Cockerell

Intercepted in California on orchid from Australia.

55. **Pseudaonidia trilobitiformis** (Green)

Intercepted at Washington, D.C. on *Sobralia* sp. from Brazil.

56. **Chrysomphalus aonidium** (Linnaeus)

Has a world-wide distribution, and an extensive range of food-plants. Has been intercepted in California on orchids from Guatemala, Manila and New Jersey. Has been recorded on orchids in conservatory in San Francisco, California.

57. **Chrysomphalus aurantii** (Maskell)

Also has a wide range geographically, and as to food-plants. Has been intercepted in California on orchids from Hawaii.

58. **Chrysomphalus dictyospermi** (Morgan)

Described from Demerara on palm. Has been intercepted in California on orchids from New Jersey, Guatemala, Venezuela and Chile. Intercepted at Honolulu and in Texas on *Odontoglossum citrosimum* from Mexico. A variety was intercepted at Honolulu on *Staurochilus davisii* from the Philippines. Intercepted at Washington, D.C., on *Epidendrum* sp. from Mexico and on *Dendrobium draconis* from Burma. The variety *arecae* has been reported on orchids in conservatory in San Francisco.

59. **Chrysomphalus dictyospermi arecae** (Newstead)

This variety has been found on orchids in Golden Gate Park, San Francisco. It is also recorded on *Cypripedium* and *Dendrobium* in greenhouses in England.

60. **Chrysomphalus nigropunctatus** (Cockerell)

Intercepted in Texas on orchid from Mexico.

61. **Chrysomphalus obscurus** (Comstock)

Has been recorded on *Laelia albida*, but it occurs mostly on other plants.

62. **Chrysomphalus perseae** (Comstock)

Recorded on orchids in New Jersey greenhouses. Also intercepted in New Jersey on orchids from Central America. Intercepted in California on orchids from Colombia.

63. **Chrysomphalus rossi** (Maskell)

Reported on orchids in Hawaii. It is recorded in New Jersey greenhouses on orchids from the Philippines. Intercepted at Honolulu on *Phalaenopsis mariae*, *P. schilleriana*, *P. amabilis*, *P. leucorrhoda* and *Vanda boxallii* from the Philippines; on *Dendrobium superbiens* from Australia; on *Ionopsis satyrioides*, *Oncidium luridum intermedium* and *O. variegatum* from Dominican Republic. Intercepted in California on *Phalaenopsis schilleriana*, *P. aphrodite* and *P. amabilis* from the Philippines.

64. **Chrysomphalus scutiformis** (Ckll.)

Described from Mexico, without record of food-plant. Has been intercepted in California on orchids from New Jersey.

65. **Chrysomphalus umboniferus** (Newstead)

Described from Guiana on *Lecythis* (not an orchid). Has been intercepted in California on *Epidendrum stamfordianum* from Costa Rica, *Laelia* sp. from Venezuela and *Oncidium sphacelatum* from Guatemala; at New York on *Cattleya* sp. from the Canal Zone.

66. **Aonidiella eremocitri** McKenzie

This scale was described from Australia. It has been intercepted at Honolulu on *Coelogyne asperata* from Thailand.

67. **Pseudischnaspis bowreyi** (Cockerell)

Intercepted at Honolulu on *Oncidium ampliatum* from the Canal Zone. Intercepted at Washington, D.C. on *Cattleya skinneri* and *Epidendrum costaricensis* from Dominican Republic.

68. **Pseudoparlatoria ostreata** Cockerell

Described from Jamaica. Listed by Fullaway as incidental on orchids. Intercepted at Washington, D.C. on *Epidendrum christi* and *Oncidium henckenii* from Dominican Republic. Intercepted at Honolulu on *Laelia superbiens* from Guatemala. Intercepted at Puerto Rico on *Cattleya* sp. from Venezuela.

69. **Pseudoparlatoria parlatorioides** (Comstock)

Described from Florida. Has been reported on a variety of plants, among them *Oncidium varicosum*. Intercepted at Washington, D.C. on *Cypripedium* sp. from England, on orchid from Honduras, on *Cypripedium clinkaberryannum* and *Brassavola* sp. from Peru. Intercepted in California on *Laelia autumnalis* from Trinidad. Intercepted at Washington, D.C. on *Lycaste* sp. Intercepted at Puerto Rico on *Cattleya gaskelliana* and *C. mossiae* from Venezuela.

70. **Lepidosaphes chinensis** Chamb.

Described from Canton, China, on "magnolia". Has been found on *Cymbidium* sp. in a California greenhouse.

71. **Lepidosaphes tubulorum**

Intercepted at Washington, D.C., on *Cymbidium* sp. from England.

72. **Lepidosaphes beckii** (Newman)

Intercepted in California on orchids from Ceylon.

73. **Lepidosaphes cocculi** (Green)

Intercepted in California on orchids from Manila; at Honolulu on orchid from China and on *Dendrobium* from Manila.

74. **Lepidosaphes pallida** (Green)

Intercepted in California on orchid from Java.

75. **Lepidosaphes** sp.

An undetermined, apparently new species, has been found infesting orchids in Honolulu.*

*See p. 219, this issue.

76. *Parlatoria pergandii* Comstock

Intercepted in California and at Honolulu on orchids from Manila. Also recorded on orchids in conservatory in San Francisco.

77. *Parlatoria mangiferae* Marlatt

Described from mango leaves in U.S.D.A. greenhouses, Washington, D.C. Also recorded from Singapore. Intercepted in Japan on orchids from Malaya. Intercepted in California on orchids from Singapore and Manila.

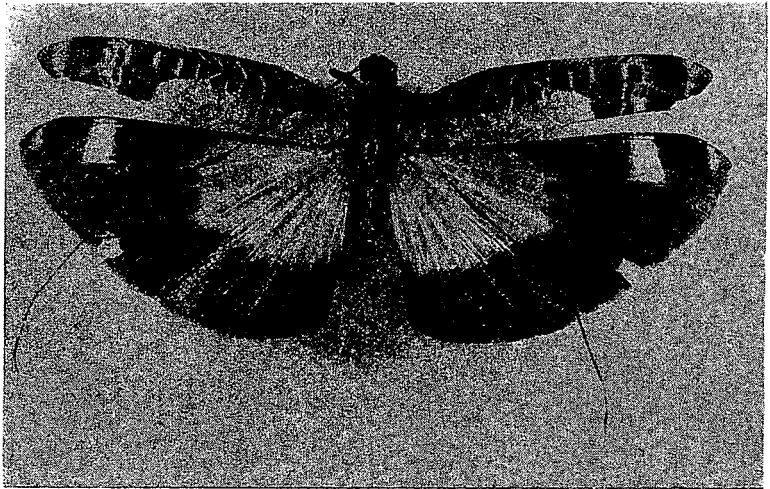


Fig. 1. *Harroweria gloriosa* Hebard, male, $\times 1.2$.

78. *Parlatoria mytilaspiformis* Green

Described from Ceylon, on *Psychotria*. Has been recorded on orchids in Hawaii. Intercepted in California on *Aerides* sp. from the Philippines.

ORTHOPTERA

TETTIGONIIDAE

***Harroweria gloriosa* Hebard (fig. 1)**

Trans. Am. Ent. Soc., 53: 89, pl. 18, fig. 2, 1927.

This attractive katydid gained admission to Honolulu under interesting circumstances, which it is well to relate, although the evidence does not convict it of being a real pest of orchids. On March 20, 1933, Dr. Lyon found peculiar katydid-like insects hatch-

ing from the thick leaf of an *Oncidium stipitatum*, which he had received from Panama about seven months previously. Being different from any known insect in Hawaii, these young insects were carefully retained in the quarantine room at the Experiment Station, H.S.P.A., as was also the leaf cut from the orchid. A total of 28 hatched from the leaf during about three weeks. The scars made where eggs had been inserted in the leaf were so obscure as to have escaped notice until hatching began, on the date mentioned above. The young insects were tried on various plant food, including orchid flowers, and it was found that their choice was canna flowers. Accordingly, they were reared on this diet, and fourteen katydids matured in the course of about two months. Being an entirely unknown insect, specimens were sent for determination to Morgan Hebard at the Academy of Natural Sciences, Philadelphia, who recognized it as the species *Harroweria gloriosa*, which he had previously described from a single specimen collected at Gatun, Canal Zone, in 1916. Apparently, the only association of this insect with the orchid, was a convenient and appropriate place for inserting its eggs. Any fleshy plant might have served the same purpose. This demonstrates the possibilities of insects smuggling in, in orchid plants, and the necessity of utmost precautions in the importing of orchid plants.

Sexava nubila (Stål)

Moristus nubilus Stål, Recensia Orthopterorum, 2: 96, 1874.

Sexava nubila, Kirby, Cat. Orthoptera, 2: 359, 1906.

Sexava novae-guineae (Brancsik)

Moristus novae-guineae Brancsik, Jahresh. Ver. Trencsen., 19: 81, 1897.

Sexava novae-guineae, Kirby, Cat. Orthoptera, 2: 359, 1906.

These two tettigoniids are pests of coconut trees in New Britain. They oviposit frequently in fleshy plant tissues, and it has been suggested that this pest may be spread by their eggs, having been laid in fleshy leaves of orchids growing as epiphytes on coconut trunks. Thus, these eggs might be carried to other regions in imported orchids from New Britain, similarly to the incident of *Harroweria gloriosa* detailed above.

Elimaea punctifera (Walker)

Phaneroptera punctifera Walker, Cat. Derm. Salt. B.M., 2: 342, 1869.

Elimaea punctifera, Kirby, Cat. Orthoptera, 2: 396, 1906.

This large species has been reported ovipositing in orchid leaves occasionally in Honolulu.

Tachycines asynamorus Adelung

Annuaire Mus. Zool., St. Petersburg, 7: 56, 1902.

Reported to sometimes injure flowers and young leaves of orchids in Russia.

LOCUSTIDAE

Valanga nigricornis (Burmeister)

Acridium nigricorne Burm., Handb. Ent., 2: 629, 1838.

Valanga nigricornis, Leefmans, Bandoeng, N.V. Mij. Vorkink, 1931.

This large grasshopper feeds destructively on the leaves and flowers of several kinds of orchids in Java: *Vanda*, *Phalaenopsis*, *Liparis* and *Dendrobium*. This would naturally be only in the open. Plants in orchid houses would not be subject to their depredations.

GRYLLIDAE

Grylloides sigillatus (Walker)

Intercepted at Honolulu in orchid debris from the Philippines, and orchid packing from England; at Washington, D.C., with orchids from the Canal Zone.

PHASMIDAE

Carausius morosus Brunner

This walking stick insect was described from India and has been recorded as eating leaves of orchids there.

DERMAPTERA

1. **Forficula auricularia** Linnaeus

This earwig has been occasionally observed on orchids, especially on the young leaves and flowers. Intercepted at Washington, D.C. on orchid from Brazil.

2. **Skalistes vidua**

Intercepted at Washington, D.C. on orchid from Guatemala.

3. **Eparchus cruentatus** Burr

Intercepted at Honolulu in orchid packing from the Philippines.

4. **Labia curvicauda** (Motschulsky)

Intercepted at Honolulu in orchid debris from the Philippines.

5. **Chelisoches morio** (Fabricius)

Intercepted in California with orchids from the Dutch East Indies and New Guinea.

ROACHES

The following four roaches have been reported as occasional minor pests on orchids:

1. *Blatta orientalis* Linnaeus
2. *Periplaneta americana* (Linnaeus)
3. *Pycnoscelus surinamensis* (Linnaeus)
4. *Blaberus discoidalis* Serville
5. *Graptoblatta notulata* (Stål)

This last roach has been intercepted at Honolulu on orchids from India.

THYSANOPTERA (Thrips)

At least twenty species of thrips have been found associated with orchids, chiefly in the buds and flowers. Only a few of them are of much importance, however, the greater number of them having been intercepted on imported orchids from various regions. Several have been described from orchids and named accordingly. A few others use orchids as their favored food plant. In Hawaii, four species have been troublesome in orchid houses: *Chaetanaphothrips orchidii* (Moulton), *Taeniothrips xanthius* (Williams), *Hercotothrips femoralis* (Reuter) and *Heliothrips haemorrhoidalis* (Bouché).

THRIPS DESCRIBED FROM ORCHIDS

1. *Anaphothrips orchidaceus* Bagnall

Ent. Mo. Mag., 45: 33, 1909.

Described from hothouse orchids in England and Ireland: *Odontoglossum*, *Cypripedium*, *Zygopetalum*. It is known as the yellow orchid thrips, and is quite injurious. It has been intercepted at Washington, D.C. on *Miltonia* sp. from England; at Honolulu on *Phaius ashworthianus* and *Miltonia* sp. from England, *Cymbidium* sp. from Belgium and on orchids from Mexico; in California on *Laelia* sp. from Mexico, on *Cattleya mendelli* from Peru, on *Miltonia pulchra* and *Odontoglossum* sp. from England; in Texas, on orchids from Mexico, Colombia and Costa Rica; in Florida, on orchid from Colombia.

2. *Anaphothrips orchidearum* Bondar

Chacaras e Quintaes, S. Paulo, 44: 435, 1931.

Described from Bahia on leaves and flowers of *Coryanthes*, *Cyrtopodium*, *Catasetum* and *Miltonia*. I found no other locality record for it.

3. **Anaphothrips corbetti** Priesner

Proc. Royal Ent. Soc., London, (B), 5: 209, 1936.

Described from flowers of *Vanda Miss Joaquim* in Malaya. I found no other locality record for it.

4. **Chaetanaphothrips orchidii** (Moulton)

Euthrips orchidii Moulton, U.S.D.A., Ent. Tech. Ser., 12: 52, 1907.

Chaetanaphothrips orchidii, Bailey, Pan-Pacific Ent., 11: 166, 1935.

Described from orchids in greenhouse in California. Has been reported also destructive to *Cypripedium* spp. in greenhouses at Washington, D.C., and Louisville, Kentucky. Intercepted at Washington, D.C. on *Odontonia tyana argus* from England, and in California on orchid from Dominican Republic and on *Cypripedium curtisi* from Australia. It occurs in orchid houses in Honolulu, being first reported in 1929. It is also recorded on *Anthurium* and *Commelina nudiflora*; and on orange, grapefruit and tangelo in Florida.

5. **Gynaikothrips orchidis** Moulton

Bull. Brooklyn Ent. Soc., 22: 200, 1927.

Described on a single specimen from an orchid in Manila. I have found no other record of it.

6. **Helionothrips errans** (Williams)

Heliothrips errans Williams, Entomologist, 49: 243, 1916.

Helionothrips errans, Hood, J. Ent. Soc., S. Africa, 3: 41, 1940.

Described from *Laelia anceps* in greenhouse in England. Has been intercepted at Washington, D.C. on *Cypripedium* sp., *Cattleya bertheuana* and *Laeliocattleya soulange* x *Cattleya wottersiana* from England.

7. **Taeniothrips xanthius** (Williams)

Physothrips xanthius Williams, Bull. Ent. Research, 8: 59-61, fig., 1917.

Taeniothrips xanthius Watson, Bull. 168, Florida Exp. Sta.: 42, 1923.

Described on *Cattleya* from Trinidad where it damages the leaves of *Cattleya* and other orchids. It is a pest in orchid houses in Honolulu where it was first recorded in 1935.

8. **Dichromothrips orchidis** Priesner

Described from Burma. In greenhouse, brought in with *Dendrobium thyrsiflorum*.

THRIPS INCIDENTALLY ON ORCHIDS OR INTERCEPTED
ON IMPORTED ORCHIDS

1. **Chirothrips falsus** Priesner

Described from Mexico. Has been intercepted in Texas on orchids from Mexico.

2. **Scirtothrips longipennis** (Bagnall)

Described on palm in Belgium. Has been intercepted on *Cypripedium* sp. at Honolulu from England.

3. **Heliothrips haemorrhoidalis** (Bouché)

A general feeder. Has been reported on orchids in Honolulu, and on *Cattleya* in California.

4. **Hercinothrips femoralis** (Reuter)

On several plants. In the States called the sugar beet thrips. Has been recorded on orchids in greenhouses in Honolulu, the first record being 1935. Intercepted at Honolulu and in New Jersey on *Cypripedium* from England.

5. **Parthenothrips dracaenae** (Heeger)

Described from *Dracaena*, and occurs also on palms. Has been intercepted at Washington, D.C. on *Cypripedium* sp. from England, and *Laeliocattleya britannia alba* from France. Intercepted at Honolulu on *Sobralia colmanae* from England.

6. **Frankliniella fortissima** Priesner

Described from Mexico. Has been intercepted in Texas on orchid from Colombia.

7. **Kakothrips pisivora** (Westwood)

The pea thrips described in England. Has been recorded on *Orchis* in Galicia.

8. **Taeniothrips smithi** (Zimmerman)

Described from Java. Has been reported in flowers of orchids in Formosa.

9. **Hoplandrothrips nigricestus** Hood

Described from dead leaves, Canal Zone. Has been intercepted at Washington, D.C. on orchid from Colombia.

10. **Hoplandrothrips reynei** (Priesner)

Described from a palm in Surinam. Has been intercepted in California on *Cattleya dowiana* from Colombia.

11. **Liothrips vaneeckei** Priesner

Described from the Netherlands. Has been intercepted at Wash-

ington, D.C. on lily bulbs from various European countries and on *Vanda roxburghi* from Ceylon.

12. **Haplothrips melaleuca** (Bagnall)

Described from a cruciferous plant in palm house in Denmark. Has been intercepted at Honolulu on *Renanthera monachica* from the Philippines.

13. **Haplothrips gowdeyi** (Franklin)

Has been reported feeding in orchid flowers in Honolulu.

14. **Frankliniella**, near **sulphurea** Schmutz

Has been reported feeding in orchid flowers in Honolulu.

15. **Thrips hawaiiensis** (Morgan)

Has been reported feeding in orchid flowers in Honolulu.

16. **Selenothrips indicus** (Bagnall)

Intercepted at Honolulu on orchids from India.

17. **Dichaetothrips williamsi** Karny

Described from Guatemala with no mention of host plant. Has been intercepted at Honolulu on *Oncidium splendidum* from Guatemala.

Besides those listed, there have been many interceptions of thrips on orchids from various regions, with incomplete determinations, the records being merely as *Liothrips* sp., *Frankliniella* sp., etc. Intercepted thrips on orchids with such incomplete records have been recorded in the following genera which are not in the above lists: *Aleurodothrips*, *Allothrips*, *Amblythrips*, *Brachythrips*, *Dicaiothrips*, *Glaucothrips*, *Hoplothrips*, *Hindsiana*, *Neophysopus*, *Physopus*, *Oxythrips*, *Phloeothrips*.

EMBIOPTERA

Several species of embiids have been recorded as injurious to the roots of orchids in greenhouses, but they are not exclusively orchid insects. Of those listed below, only the first one occurs in Hawaii, and it is not here reported injurious to orchids.

1. **Oligotoma saundersii** (Westwood)

Has been reported injurious to *Phalaenopsis amabilis* in Java, causing a failure to flower.

2. **Oligotoma vossleri** Krauss

Causing injury similar to the above; also in Java.

3. *Oligotoma michaeli* McLachlan

Recorded from London as injuring roots of orchids in green-houses.

4. *Oligotoma trinitatis* (Saussure)

Observed in Trinidad, injuring roots of orchids.

5. *Antipaluria urichi* (Saussure)

Observed also injuring roots of orchids in Trinidad.

ISOPTERA

1. *Nasutitermes cornigera* (Motschulsky)

This termite has been intercepted at Honolulu with *Sobralia panamensis* from the Canal Zone; at Washington, D.C. with *Epidendrum* sp. from Costa Rica, and with *Cattleya* sp. from Colombia; in New Jersey with *Cattleya* sp. from Colombia and Costa Rica.

2. *Nasutitermes* sp.

Has been intercepted in California with *Cypripedium lowii giganteum* from Borneo.

COLLEMBOLA

Orchesella cincta (Linn.)

Young plants just germinating from seeds are subject to destruction by these small insects.

INSECTS WHICH POLLINATE ORCHIDS

Quite a number of insects have been recorded as definitely having been observed visiting orchid flowers and being instrumental in performing pollination. The structure of the flowers in most species is such that it requires the visit of an insect to which the pollen masses, or pollinia, become attached in such a position so that when the next flower is visited, the pollen comes into contact with the stigmatic surface, and thus brings about cross-pollination. In Darwin's book on "Fertilization of Orchids," the structure of various kinds of orchid flowers is explained with reference to the manner in which this pollination by insects could be accomplished, and in some cases the actual species of insect is mentioned, but in the majority of cases the actual species of insect which would be involved has not been observed and, hence, not mentioned. Those which have been observed visiting orchid flowers, or have been captured and found to have orchid pollinia attached to some part of the body are mainly butterflies, night-flying moths, bees, and small flies.

The following list includes insects which have been found in literature, most of them being from Darwin's "Fertilisation of Orchids".

BUTTERFLIES

1. *Polyommatus alexis* Hübner
2. *Lycaena phlaeas* (Linn.)
3. *Arge galathea* (Linn.)
4. *Hesperia sylvanus* Esper
5. *Hesperia linea* Fabr.
6. *Syricthus alveolus* (Hübner)

These six butterflies were collected, having pollinia of *Orchis pyramidalis* attached.

7. *Nisoniades* sp.

Collected with pollinia of *Platanthera hookeri* on eyes.

8. *Pyrgus elmo* Trimen

Collected with pollinia of *Bonatea darwini* on sternum.

MOTHS

1. A sphingid moth has been discovered in Madagascar with proboscis long enough to reach the nectar in the 11½-inch nectary of *Angraecum sesquipedale*.

2. *Agrotis segetum* Schiff.

3. *Anaitis plagiata* (Linn.)

These two moths were collected having pollinia of *Habenaria bifolia* attached at base of proboscis.

4. *Cucullia umbratica* Linn.

5. *Hadena dentina* (Esper)

6. *Phisia vaureum* Guen.

Collected with pollinia of *Habenaria chlorantha* attached to eyes.

7. *Lithosia complana* (Linn.)

8. *Anthrocera filipendulae* Linn. (Zygaenidae)

9. *Anthrocera trifolii* Esper (Zygaenidae)

10. *Leucania lithargyrae* (Esper)

11. *Caradrina blanda* Treitschke

12. *Caradrina alsines* (Brahm)
13. *Agrotis cataleuca* (Boisduval)
14. *Eubolia mensuraria* Schiff.
15. *Hadena dentina* (Esper)
16. *Heliothis marginata* (Fabr.)
17. *Xylophasia sublustris* (Esper)
18. *Euclidia glyphica* (Linn.)
19. *Toxocampa pastinum* Treitschke
20. *Melanippe rivaria*
21. *Spilodes palealis* Schiff.
22. *Spilodes cinctalis* Treitschke
23. *Acontia luctuosa* Esper

The above moths (nos. 7-23) were collected with pollinia of *Orchis pyramidalis* attached to the proboscis.

24. *Plusia chrysitis* (Linn.)
25. *Plusia gamma* (Linn.)
26. *Anaitis plagiata* (Linn.)
27. *Triphaena pronuba* (Linn.)

Moths nos. 24-27 were caught at night with pollinia of *Gymnadenia conopsea* on proboscis.

BEES

1. *Andrena nigro-olivacea* Dours
2. *Andrena senecionis* Perez
Flowers of *Ophrys lutea* visited by these two bees.
3. *Andrena nigroaenea* var. *nigrosericea* Dours
Flowers of *Ophrys fusca* visited by this bee.

4. *Andrena trimmerana* (Kirby)
This bee visited flowers of *Ophrys fusca* and *Ophrys arachnitiformis*.

5. *Andrena* spp.
Five species have been observed to pollinate flowers of *Cypripedium calceolus*.

6. **Apis mellifera** Linn.

The honeybee was observed pollinating flowers of *Epipactis palustris*, *Orchis morio* and found trapped in flowers of *Cypripedium parviflorum*.

7. **Eucera longicornis** (Linn.)

8. **Osmia rufa** (Linn.)

Fertilized flowers of *Orchis morio*.

9. **Halictus pilosus** Smith

10. **Halictus confusus** Smith

11. **Nomada cuneata**

Were found trapped in flowers of *Cypripedium parviflorum*.

12. **Bombus muscorum** (Linn.)

Observed visiting flowers of *Orchis morio* and *Orchis mascula*.

13. **Bombus lucorum** (Linn.)

Observed visiting flowers of *Epipogium gmelini*.

14. **Bombus pratorum** (Linn.)

Collected with pollinia of *Goodyera repens* on proboscis, also with pollinia of *Orchis morio*.

15. **Bombus silvarum** (Linn.)

16. **Bombus lapidarius** (Linn.)

17. **Bombus confusus** Schenck

Collected with pollinia of *Orchis morio* attached.

Bombus sp.

Pollinated flowers of *Sobralia macrantha*.

Bombus (several undetermined species)

Pollinated flowers of *Spiranthes autumnalis*, *Oncidium* sp. and *Orchis latifolia*.

Twelve kinds of bees have been observed visiting flowers of *Orchis latifolia*. Names were not given.

18. **Ceratina albilabris** (Fabr.)

Pollinated *Serapias cordigera*.

19. **Euglossa piliventris** Guerin

20. **Euglossa caennensis** (Fabr.)

Pollinate flowers of *Catasetum tridentatum* and *Monachanthus viridis*.

Euglossa sp.

Found with pollinium of *Stanhopea* on its back.

Euglossa sp.

Seen gnawing the labellum of *Catasetum*, *Coryanthes*, *Gongora* and *Stanhopea*.

Euglossa sp.

Pollinates *Coryanthes macrantha*.

21. **Xylocopa violacea** (Linn.)

Found with pollinia of *Aceras* (*Orchis*) *longibracteata* attached to its forehead.

STINGING ANTS

Inhabit special cavities in the pseudobulbs of *Schomburgkia tibicinus*, *Diacrinus bicornutum* and *Diacrinus bilamellatum*.

WASPS, ETC.

1. **Crabro brevis** Linden

This wasp observed to pollinate *Epipactis palustris*.

2. **Lissopimpla semipunctata** (Kirby)

This ichneumonid pollinates *Cryptostylis leptochila*, *C. ovata*, *C. erecta* and *C. subulata*.

3. **Hemiteles** and **Cryptus**

Have been observed with the pollinia of *Listera ovata* attached.

4. **Scolia** (**Dielis**) **ciliata** (Fabr.)

This wasp pollinates *Ophrys speculum*.

5. **Vespa sylvestris** Scopoli

Epipactis latifolia is pollinated by this wasp.

6. **Tetrastichus diaphantus** (Walker)

This small chalcid-fly observed visiting flowers of *Herminium monorchis*.

Hymenopterous and dipterous insects (several spp.) were observed visiting flowers of *Orchis longibracteata* and *Listera cordata*.

FLIES

1. **Musca domestica** Linn.

The housefly pollinated *Caladenia dimorpha*.

2. **Sarcophaga carnosa**

3. *Coelopa frigida* Fallen

Collected with pollinia of *Epipactis palustris* attached.

Sarcophaga sp.

This fly observed feeding on secretion of the flower of *Ophrys mucifera*.

4. *Empis livida* Linn.

5. *Empis pennipes* (Linn.)

These two flies were observed in numbers inserting proboscis in nectary of *Orchis maculata*.

6. Bombylius-like fly

Was observed visiting flowers of *Disa grandiflora*.

DIPTERA (Undetermined)

Flies were observed visiting the flowers of *Acianthus sinclairii* and *Cyrtostylis oblonga*.

Several species of flies (some minute) fertilize the flowers of *Pterostylis banksii*, *P. graminea*, *P. puberula* and *P. trullifolia*.

BETLES

1. *Malthodes brevicollis* Paykull

Visited flowers of *Herminium monorchis*.

2. *Strangalia atra* Panzer

This longicorn beetle was captured with a tuft of the pollen-masses of *Orchis latifolia* attached to the front of its mouth.

THRIPS

In flowers of *Listera ovata*, scattering of pollen was largely aided by thrips.

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