

from the anterior margin backward to about the posterior fourth, narrowed at its middle, and more or less pointed behind; prosternum entirely orange-yellow except for coxal margins and distal part of mucro; and (2) a short basal orange-yellow area on each elytron, infuscate posteriorly and failing to attain either the suture or the humerus. Pubescence coarse, erect, black throughout except on hind prothoracic angles and along anterior margin of the elytra, where it is yellowish.

Front convex above, flattened on anterior half; punctation moderately fine, dense, uniform. Antennae strongly serrate from 4th segment on; exceeding hind angles of prothorax by about one segment; 3rd nearly twice as long as 2nd, the two together slightly longer than 4th; 4-10 triangular, becoming progressively broader distally; 11th oval.

Prothorax wider than long; sides subparallel from hind angles to anterior third, thence arcuately narrowed to anterior margin. Pronotum strongly convex; punctation anteriorly as on head, finer and sparser toward rear; shallowly depressed medianly at base. Hind angles subparallel, broad, convex, vaguely unicarinate. Mucro moderately upcurved before hind coxae.

Scutellum elongate oval; feebly convex. Elytra at base slightly narrower than prothorax; gradually narrowed to beyond middle, thence more rapidly to the conjointly rounded apices; stria punctures feeble, vague, especially distally; intervals flat.

Described from a holotype female: BISMARCK ARCHIPELAGO, *New Britain*, iv. 11. 1941, on blossoms of *Melaleuca* sp. (J. L. Froggatt) C 2662; and one paratype female, with same data and collection number. The holotype is in the British Museum collection, the paratype in the H.S.P.A. Experiment Station collection.

### The Insects of Canton Island

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(Presented at the meeting of May 11, 1942)

The use of Canton Island as a commercial airplane station during the past two years affords an opportunity to follow the changes that occur in the fauna of a small, isolated atoll when it is suddenly exposed to sustained contact with the outside world. Until very recently visitors to the island have been comparatively few: occasional castaways; a labor force which exploited the guano deposits for a year or more in the 1880's; a brief stay by a landing party to set out coconuts in 1916; and now and then short visits by naval parties or scientific expeditions. Continuous occupation of the island (by a British radio officer) dates from the summer of 1937.

In 1939 the Pan American Airways Company began construction of a base on Canton in preparation for regular service between Honolulu and Auckland. By the summer of 1940 Clipper planes

were touching at the island, and supply ships had begun regular calls. Importations of planting materials and of soil were made in connection with the landscaping of the airport grounds.

Faunal changes were bound to follow; some are already noticeable. More are certain to occur within the limits set by a simple flora and meagre water resources. Entomologists in Hawaii should keep informed of such changes because, using Canton as a stepping-stone, insect immigrants from the south Pacific might arrive here which could adversely affect the agriculture and the health of these islands.

Through the cooperation of the Pan American Airways the Hawaiian Sugar Planters' Association has, since April 1940, maintained on Canton a plant quarantine service. Planes, whether north- or southbound, are inspected and sprayed to rid them of living insects; assistance is given the airport's landscaping program; and a collection of the island's insects has been assembled.

How long the majority of the insects on Canton have been established there is largely guesswork. However, a few can be grouped into various categories on that basis with reasonable assurance.

1. *Species long, and probably permanently, established.* Here are to be included most of the insects attached to the truly native plants: *Achaea* on *Cordia*; *Utetheisa* on *Tournefortia*; the unidentified caterpillar and the agromyzid leafmining fly on *Scaevola*; and the cicadellid leafhopper on *Boerhaavia*. The *Pethrochroa* moth, the larvae of which feed on the trash about bunchgrass clumps, is also probably long established.

2. *Species temporarily established.* In common with some other equatorial Pacific islands, Canton is subject to remarkable variation in annual rainfall:

1938.....	8.7 inches
1939.....	18.4 "
1940.....	69.3 "
1941.....	112.6 "

Whatever the length of cycle (if indeed there is a definite cycle), it is clear from records elsewhere and from the evidence of vegetation on the island prior to 1940, that periods of extremely scanty rainfall have occurred; there is no reason to believe that they will not occur again. There are no sources of water on the island other than catchment from rains, and during a succession of dry years it is unlikely that storage facilities would suffice for much beyond personal needs. It is certain that plant life on the island would then suffer severely, and so would much of the insect life associated with it.

The handsome *Hypolimnas* butterfly arrived at Canton during 1939 and 1940 at long intervals, and only as an isolated straggler. By 1941, when a comparatively luxurious vegetation had made its

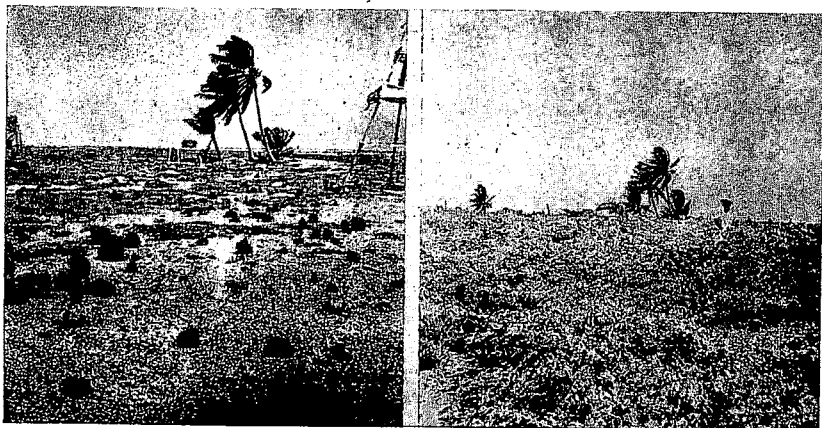


Fig. 1. Views taken on Canton Island two years apart showing contrast in vegetation (resulting mainly from growth of *Sida*) between a dry year and a wet one. The photograph on left taken by A. C. Browne in October 1939 (total rainfall for 1939, 18 inches); the other in September 1941 (1941 rainfall, through August, 84 inches). (From Planters' Record, Vol. XLVI, 2nd quarter.)

appearance, the butterfly was maintaining itself in considerable numbers. If the *Sida* foliage on which its larvae feed should approach extinction as a result of protracted drought, this insect would be sharply reduced in numbers and might even vanish as a resident of the island, to be reestablished by chance immigrants only when conditions again became favorable.

The dragonflies now on Canton also are strong-flying species which undoubtedly reached the island from time to time in years past. But however often they might arrive there, they could not breed unless there were reasonably fresh water in which their young could develop. By late 1940 or early 1941 a few pools of rainwater had collected which have persisted, and now both species are breeding on the island. Drying up of these pools will inevitably eliminate the dragonflies as an established part of the island fauna.

It is due to chance that the monarch butterfly has not similarly established itself. On at least one occasion (in 1940) an adult monarch reached the island, where food suitable for its larvae was already present (the introduced *Calotropis* or "crown flower").

3. *Recent immigrants.* The most obvious of the accidentally introduced insects within the past two years are the coccids, all of which, with one or two possible exceptions, have come to Canton on planting material brought from Honolulu since 1939. One or more of the five ants represented on the island may have arrived similarly in imported soil. Certainly introduced, although it is impossible to say how recently, are the cosmopolitan beetles which

attack stored foods (*Tribolium*, *Calandra*, *Necrobia*). Flies seem particularly well adapted to travel in airplanes, and some of those now on Canton may have arrived in that way, despite efforts to destroy insect stowaways on planes in flight. Three insect species have been intentionally introduced to combat pests already present; two of these, an evaniid parasitic in cockroach egg-cases, and a scellionid parasite of armyworm eggs, are now established.

The list which follows records all the insects and related forms known to occur on Canton at the end of 1941. It is the result of collections and observations made by the following men stationed on the island as H.S.P.A. quarantine entomologists: D. B. Langford, April to July 1940; R. R. Danner, September 1940 to August 1941; and C. A. Ely, from September 1941 until the recent suspension of the service. The writer spent about 16 weeks on the island from July to October 1940, and from August to October 1941.

Most of the identifications have been made by the entomological staff of the Experiment Station, H.S.P.A.; for others we are indebted to Mr. D. T. Fullaway, to Mr. E. C. Zimmerman, and to Dr. R. L. Usinger of the University of California. Species known to occur in the Hawaiian Islands are so indicated by an asterisk.

## CRUSTACEA

*Isopoda*

- \**Metaponorthrus pruinosus* Brandt  
Under heap of old coconuts.  
Undet. species  
Under heap of old coconuts.

*Amphipoda*

- Undet. species  
"Sandhoppers" found beneath stranded timbers along lagoon beach.

## ARACHNIDA

*Scorpionoidea*

- \**Isometrus maculatus* De Geer  
Found occasionally in buildings.

*Araaneida*

## Lycosidae

- Undet. species  
Found about buildings.

## Sicariidae

*Scytodes* sp.

## Oonopidae

*Gamasomorpha minima* Berland

Described from Canton (Bishop Mus. Occ. Papers, xvii, 1, p. 5, May 1942).

## Pholcidae

Undet. species

A single specimen seen in hotel, September 1941.

## Argiopidae

*Neoscona* sp.

The orb-webs of this spider are conspicuous about buildings.

## Filistatidae

*Filistata bakeri* Berland

Recorded from Canton by Berland (Bishop Mus. Occ. Papers, xvii, 1, p. 24).

*Acarina*

## Gamasidae

*Laelaps* sp.Taken on ground-nesting Polynesian rat. C. E. Pemberton, who studied this material, says the species more closely resembles *L. hawaiiensis* Ewing than *L. echidnimus* (Berlese).

## Listrophoridae

*Listrophorides* sp.

Hair mite of Polynesian rat.

## Oribatidae

Undet. species

Taken by Danner in vegetable mould beneath *Sesuvium* plants.*Ixoidae*

## Argasidae

*Ornithodoros* sp.The exuvium of an argasid tick was once found on the leaf of a "noni" (*Morinda*) shrub east of the lagoon near the old guano workings. Identified by C. E. Pemberton.

## MYRIAPODA

*Chilopoda**Mecistocephalus* prob. *maxillaris* (Gervais)

In soil beneath heap of old coconuts; under sacking in outbuildings. It probably is the same species as that found in Hawaii.

## INSECTA

*Thysanura*

## Lepismidae

Undet. species

A single specimen among papers in residence.

*Collembola*

## Entomobryidae

## Undet. species

One or more species in moist soil beneath pile of old coconuts.

*Orthoptera*

## Blattidae

\**Cutilia soror* (Brunner)

In soil beneath old coconuts; under bags on beach.

\**Periplaneta americana* (Linn.)

Common both indoors and out.

\**Pycnoscelus surinamensis* (Linn.)

In soil beneath old coconuts.

\**Supella supellectilium* (Serv.)

A single specimen in hotel room, November 1940.

## Gryllidae

\**Gryllodes sigillatus* (Walker)

Numerous in dwellings; the extremely small first-instar nymphs active in washbasins beneath lights.

## Locustidae

\**Conocephalus saltator* (Saussure)

A single specimen taken by Langford in May 1940; not seen since.

*Dermaptera*\**Anisolabis eteronoma* Borelli

A single specimen taken in June 1941 by Danner among potted plants from Honolulu; probably not established.

## Undet. species

A single specimen taken alive in September 1941 among freight boxes on barge unloading a supply ship from the Pacific coast. Not established on Canton.

*Embioptera*\**Oligotoma saundersii* (Westwood)

Not uncommon under dead seabirds; in debris of rat nests; in soil under old coconuts. Determined by E. C. Zimmerman.

*Odonata**Diplacodes bipunctata* (Brauer)

First noted by Danner in June 1941. Seen frequently in September, but less common than *Pantala*, and apparently confined to the settled part of the island west of the lagoon.

\**Pantala flavescens* (Fabr.)

First seen by Danner in February 1941. By August it was very numerous and present all over the island.

*Corrodentia*

## Atropidae

Undet. species

Taken by Danner in vegetable mould under *Sesuvium* plants.*Hemiptera-Heteroptera*

## Cydnidae

\**Geotomus pygmaeus* Dallas

At light.

## Reduviidae

\**Reduviolus capsiformis* (Germ.)

Common on low herbage; predaceous.

## Miridae

Undet. species

A single specimen taken by Langford in April 1940; not collected since.

## Halobatidae

*Halobates micans* Esch.

This marine strider is often stranded on the ocean beaches after storms. Identified by Dr. R. L. Usinger.

*Hemiptera-Homoptera*

## Aphididae

\**Aphis gossypii* GloverVery common on *Portulaca lutea* and on the recently introduced *Coccolobis uvifera*; less common on *Sida fallax* and on *Scaevola*.

## Coccidae

\**Asterolecanium pustulans* (Ckll.)On the introduced malvaceous tree "milo" (*Thespesia populnea*); undoubtedly a recent introduction from Honolulu.\**Chrysomphalus aonidum* (Linn.)

On coconut foliage.

\**Coccus hesperidum* Linn.

On "milo" and oleander; a recent immigrant.

\**Hemichionaspis minor* (Mask.)On trunk and stems of *Tournefortia argentea*.\**Pseudococcus longispinus* (Targ.)Identified by Mr. Fullaway from an undersized specimen collected on *Scaevola frutescens* by A. C. Browne in October 1939.\**Ripersia palmarum* Ehrhorn

On coconut.

\**Saissetia hemispherica* Targ.On the recently introduced "hau" (*Hibiscus tiliaceus*)

and "crown flower" (*Calotropis gigantea*); certainly a recent immigrant on plants from Honolulu.

Undet. species

A mealybug fairly common on *Sida*, on the trunk at the soil line and on the leaves which become curled and deformed.

Cicadellidae

*Nesaloha cantonis* Oman

Very common on *Boerhaavia diffusa* and apparently attached to that plant, the nymphs feeding on the blossom heads. What may be a virus disease involving this insect as a vector, produces a "little leaf" on *Boerhaavia* which was fairly common in the fall of 1940, sometimes accompanied by a leaf mottling. This insect is described in *The Pan-Pacific Entomologist*, vol. 19, no. 1, p. 33, 1943.

*Coleoptera*

Carabidae

\**Tachys muscens* Blackburn

Two specimens taken by Danner at light in June 1941; identified by E. C. Zimmerman as a species hitherto known only from the Hawaiian Islands.

*Tachys* sp.

A single specimen taken in hotel kitchen by Danner in March 1941. According to Mr. Zimmerman it differs from all the species recorded from Hawaii.

Histeridae

\**Carcinops quatuordecimstriata* (Stephens)

Among bird droppings under rookeries.

Nitidulidae

\**Carpophilus hemipterus* (Linn.)

Coccinellidae

*Harmonia arcuata* (Fabr.)

Adults of this ladybird beetle are sometimes very numerous on *Sida*, clustering by dozens on the underside of the leaves. Associated with *Aphis gossypii* on *Scaevola*. On *Boerhaavia* the larvae of the beetle have been observed feeding on the droplets excreted by the cicadellid common on that plant.

Dermestidae

\**Dermestes cadaverinus* Fabr.

Adults among dead *Cypraea* shells. On Howland Island this beetle was found within the lighthouse lamp.

Corynetidae

\**Necrobia rufipes* (De Geer)

The "copra" or "ham beetle" was taken in some numbers on the wire screening of the hotel kitchen.



## Tenebrionidae

*Alphitobius laevigatus* (Fabr.)

Under dead seabirds (where the larvae also were present); in debris of rat nests; in soil beneath old coconuts; among mollusks being dried for cleaning; and among bird droppings.

\**Tribolium ferrugineum* (Fabr.)

A single specimen collected by Danner in July 1941.

## Anthicidae

\**Anthicus oceanicus* Laferté

Under dead seabirds on the beach.

## Scarabaeidae

\**Pleurophorus parvulus* Chev.

A single specimen taken by Danner in July 1941.

\**Saprosites pygmaeus* Harr.

A single specimen in soil beneath old coconuts; September 1940.

## Calandridae

\**Calandra oryzae* (Linn.)

A single specimen on screen of hotel kitchen.

*Lepidoptera*

## Danaiidae

\**Danaida plexippus* (Linn.)

A single specimen of the monarch butterfly was seen by Danner in October 1940. Not established on Canton.

## Nymphalidae

*Hypolimnas bolina* (Linn.)

During 1940 two stragglers of this butterfly were seen, one in April by Langford, the other in July. By August 1941 the species was established and perfect specimens were numerous. Its foodplant is *Sida*.

## Arctiidae

*Utetheisa pulchelloides* Hampson

Attached to *Tournefortia*, on the leaves of which the early stages of the larvae produce a "windowpane" effect by their feeding.

## Noctuidae

*Achaea janata* (Linn.)

The larvae feed on the foliage of *Cordia subcordata*, and sometimes eat shallow pits in the immature fruits. They vary in color from light tan to blackish, and have a transverse black marking on the back about a third of the way back from the head. When disturbed they lash about irritably and drop to the ground. Pupation is in a loose web within a leaf fold. Six individuals reared to maturity had a pupal period of from 8.5 to 11 days.

*Amyna octo* Guenée

The larvae, which feed on *Sida*, are of a green color very like that of the foliage on which they rest.

\**Heliothis armigera* (Hübner)

An adult taken at light.

\**Laphygma exempta* (Walker)

The "nutgrass armyworm" on Canton breeds on *Digitaria pacifica*, on *Lepturus repens* and is especially destructive to bermuda grass lawns. *Telenomus nawai*, an egg parasite, was introduced from Honolulu and soon after was found to have established itself.

*Prodenia litura* (Fabr.)

The most destructive general pest on Canton. It has been bred on the following foliage: *Lepturus*, *Digitaria* (which it prefers to *Lepturus* when both are available), *Sida*, tomato and sweet potato. Its eggs have been found on *Morinda citrifolia*, but in the laboratory the newly hatched larvae deserted this foliage for that of *Digitaria*.

The light yellowish-green eggs are laid in masses of from 25 to well over 100, and are covered with the tan bodyhairs of the parent moth. Newly hatched larvae drop from the foliage on a fine thread if disturbed. Later stages usually have the dorsum a blackish "pepper-and-salt" with three more or less interrupted orange-yellow lines, one dorsal, the other two dorso-lateral; in a few individuals these yellowish lines are entirely absent. Pupation occurs in the soil, and takes about 10 or 11 days. The adult moths come to lights.

## Undet. species

Irregular feeding holes common on *Scaevola* leaves are caused by a bright green caterpillar probably belonging to this family; damage is conspicuous but the larvae are uncommon. Feeding apparently is at night, the larva hiding in the sand beneath the plants during the day. A single caterpillar produced the characteristic feeding holes on *Scaevola* in the laboratory and spun up within a leaf fold, but died without pupating.

## Pyralidae

\**Hymenia recurvalis* (Fabr.)

A few adults at light. The larvae will probably be found feeding on *Portulaca* and on the recent immigrant *Amaranthus*.

## Tineidae

\**Petrochroa dimorpha* Busck

This moth is exceedingly abundant and formerly, when open casks provided the island's supply of water, was a

considerable nuisance because of the numbers which collected on the surface. The larvae feed on the dead trash about bunchgrass clumps. The species is known from Wake Island as well as Canton, but has not been recorded from Samoa.

*Diptera*

Mycetophilidae

Undet. species

About soil under old coconuts.

Sciaridae

Undet. species

Taken by Danner on native vegetation.

Chironomidae

Undet. species

Taken by Danner on native vegetation.

Dolichopodidae

*Chrysosoma* sp.

Several specimens collected by Danner.

*Hydrophorus* sp.

Abundant on surface of brackish pools.

Syrphidae

\**Ischiodon scutellaris* (Fabr.)

Widespread but not numerous; predaceous on aphids.

Calliphoridae

\**Lucilia sericata* (Meigen)

Bred from dead rat; very numerous.

Sarcophagidae

\**Sarcophaga dux* Thomson

Very common.

Muscidae

\**Musca domestica* Linn.

Very abundant at times.

Anthomyiidae

\**Atherigona excisa* var. *trilineata* Stein

A single specimen.

Ortaliidae

*Euxesta* sp.

About bits of organic matter on the beach; attracted to lights.

\**Scholastes bimaculatus* Handel

A single specimen collected by Danner in July 1941. In Samoa it is said to breed in rotten meat of coconuts cut for drinking while still green, but not in ripe coconut meat or copra.

## Ephydriidae

*Hecamede persimilis* Handel

A single specimen taken by Langford, April 1940.

*Scatella* sp.

On brackish pools.

## Chloropidae

*\*Prohippelates pallidus* (Loew)

Taken in sweeping and at lights; attracted to dead animals. Sometimes very numerous aboard planes while moored at Canton during the day.

*\*Siphunculina signata* Woll.

Not common.

## Milichiidae

*\*Desmometopa m-nigrum* Zetterstedt

Several specimens collected by Langford; breeds in decaying mollusks.

*\*Milichiella lacteipennis* (Loew)

Common; taken in sweeping foliage.

## Tethinidae

*\*Tethina insularis* Aldrich

A single specimen from Canton, but very common among interceptions aboard planes at both Canton and Honolulu.

## Agromyzidae

Undet. species

Bred from leafmines in *Scaevola frutescens*; parasitized by a eulophid, *Notanisomorphomyia*.

## Hippoboscidae

*\*Olfersia spinifera* Leach

On young frigate birds.

*Hymenoptera*

## Megachilidae

Undet. species

Six megachilid cells formed of *Sida* leaves were found in November 1941 by Mrs. F. I. Fleming. The bees bred from them by Ely, now unfortunately unavailable for identification, were predominantly grey with black bands on the abdomen.

## Formicidae

*\*Paratrechina bourbonica* (Forel)*\*Paratrechina longicornis* (Latr.)

The "crazy ant" is the dominant ant in the inhabited part of the island and is a great nuisance in dwellings.

*\*Tapinoma melanocephalum* Fabr.On *Sida* plants.

\**Tetramorium guineense* (Fabr.)  
Taken by Langford in April 1940.

\**Tetramorium simillimum* (F. Smith)  
In soil beneath heaps of old coconuts.

#### Scelionidae

\**Telenomus nawai* Ashmead  
Introduced from Honolulu in August 1941; the following month it was bred from *Laphygma exempta* eggs collected on the airport grounds.

#### Eulophidae

\**Euplectrus platyhypenae* Ashmead  
An external parasite of *Laphygma* larvae; introduced from Honolulu in September 1941. Not yet known to be established on Canton.

*Notanisomorphomyia* prob. *externa* Timberlake

Bred from the leafmine of an unidentified agromyzid fly in *Scaevola*. Identified by Mr. Fullaway as probably this species, described in 1927 (Proc. Haw. Ent. Soc., vi., p. 522) from the principal islands of the Hawaiian group, where it was bred from several lepidopterous leafminers and from *Agromyza* sp.

#### Evaniidae

\**Evania appendigaster* (Linn.)  
Introduced from Honolulu in August 1940, and soon well established in egg-cases of *Periplaneta americana*.

#### SUMMARY

Isopods .....	2	Insects (Cont'd)	
Amphipods .....	1	Odonata .....	2
Scorpions .....	1	Corrodentia .....	1
Spiders .....	6	Hemiptera-Heteroptera..	4
Mites .....	3	Hemiptera-Homoptera ..	10
Ticks .....	1	Coleoptera .....	13
Myriapods .....	1	Lepidoptera .....	11
Insects		Diptera .....	21
Thysanura .....	1	Hymenoptera .....	9
Collembola .....	1	Total insect species .....	81
Orthoptera .....	6	Total related species .....	15
Dermaptera .....	1		
Embioptera .....	1	Grand total .....	96