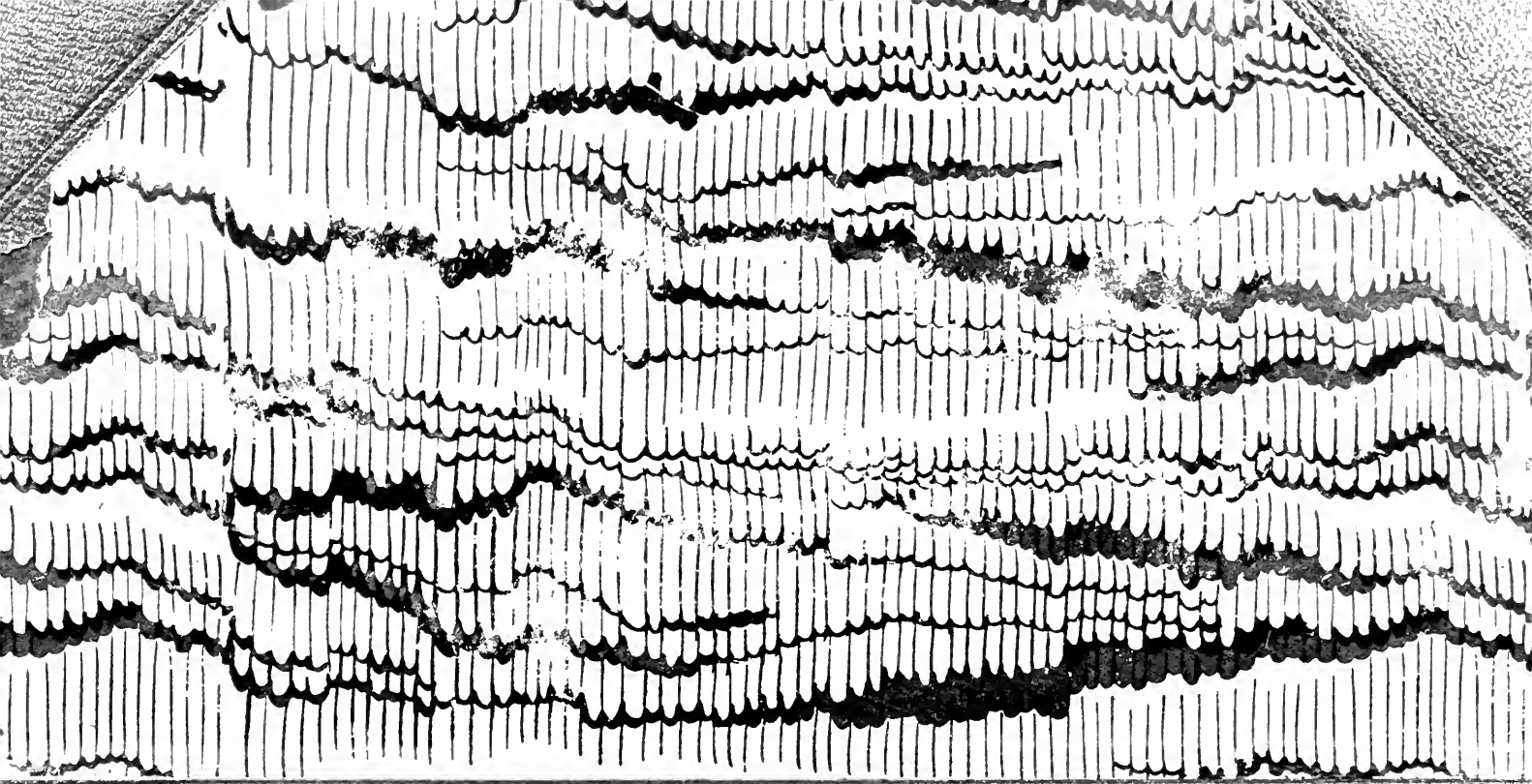

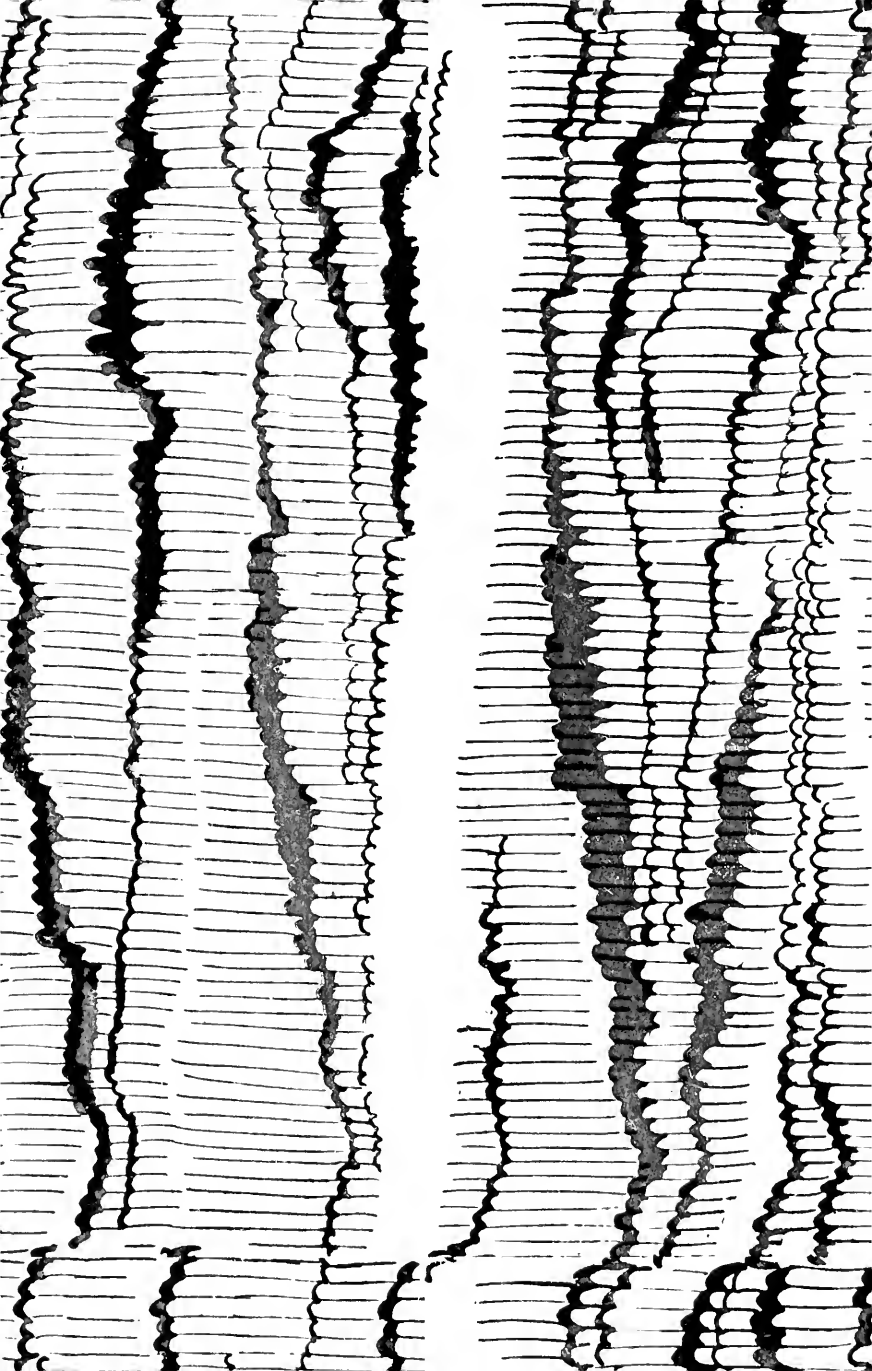

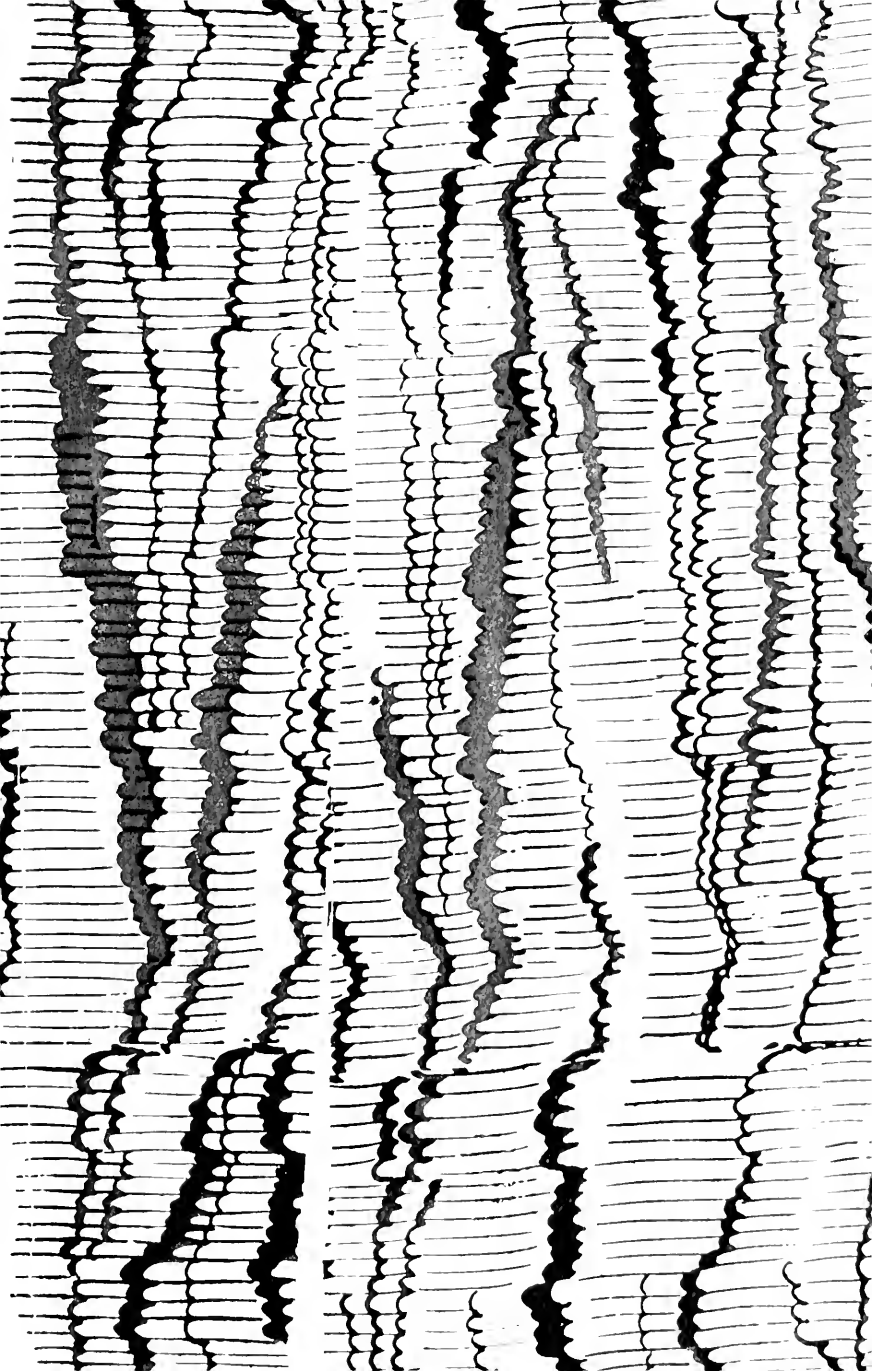

PROCEEDINGS

OF THE

Hawaiian Entomological Society

VOLUME NUMBER FOUR

1918-1920

HONOLULU, T. H.

PROCEEDINGS OF THE HAWAIIAN ENTOMOLOGICAL SOCIETY

INDEX TO VOLUME IV

(* Indicates genera, species, etc., new to science.)

INDEX TO AUTHORS, EXHIBITORS AND PARTICIPANTS IN DISCUSSIONS, ETC.

(Heavier type indicates pages containing titles of papers.)

HYMENOPTERA

DIPTERA

COLEOPTERA

LEPIDOPTERA

HEMIPTERA-HOMOPTERA

HEMIPTERA-HETEROPTERA

ORTHOPTERA

NEUROPTERA AND ODONATA

MECOPTERA AND ZORAPTERA (ARCHAIC)

PLECOPTERA (ARCHAIC)

ISOPTERA

CORRODENTIA

THYSANOPTERA

PLANT INDEX

FIRST RECORDS AND IMMIGRANTS

ERRATA IN VOLUME IV

In addition to the lists previously printed, the following have been discovered:

Page 5, line 14, for "*maculiferum*" read "*maculigerum*".
" 36, line 4 from bottom, for "coccooned" read "cocooned".
" 55, line 16, for "*extraneous*" read "*extraneus*".
" 75, line 3 from bottom, for "*Nesodryas* n. sp." read "*Hburnia lobeliae*".
" 78, line 2, for "exits" read "exists".
" 79, line 18, for "eaxmple" read "example".
" 80, line 4 from bottom, for "squamous" read "squamus".
" 82, line 13, for "rhizones" read "rhizomes".
" 88, line 4 from bottom, for "*tetramalopii*" read "*tetramolopii*".
" 90, line 9, for "*tetramalopii*" read "*tetramolopii*".
" 91, line 20, for "*tetramalopii*" read "*tetramolopii*".
" 104, line 4 from bottom, for "*tetramalopii*" read "*tetramolopii*".
" 106, line 4 from bottom, for "*tetramalopii*" read "*tetramolopii*".
" 102, line 32, for "*platyphyllum*" read "*platyphylla*".
" 109, line 14, for "*Dinacampus*" read "*Dinocampus*".
" 109, line 15, for "Crawford" read "Viereck".
" 116, line 11, omit the comma after "*Sweezyi*".
" 116, line 14, for "edges" read "eyes".
" 135, line at bottom, for "edeagus" read "aedeagus".
" 137, line 5, for "edeagus" read "aedeagus".
" 135, line 2, for "eight" read "eighth".
" 178, line 7, for "hte" read "the".

Page 181, line 7, place brackets around "Emb.".
" 201, line 11, for "narly" read "nearly".
" 209, line 16, for "transvrsely" read "transversely".
" 202, line 4, for "latter" read "occipital margin".
" 213, line 30, for "*planifrons*" read "*planiformis*".
" 228, lines 26 and 27, interchange.
" 243, line 23, for "*Cyreme*" read "*Cyrema*".
" 327, lines 12, 13, for "*sallei*" read "*sallaei*".
" 328, lines 27, 34, for "*Schistocerus*" read "*Schistoceros*".
" 477, line 6 from bottom, for "nudem" read "nudum".
" 482, line 3 from bottom, for "Devuaga" read "Devaraya".
" 486, bottom line, for "Mandidrug" read "Nandidrug".
" 515, line 36, for "*arborium*" read "*arborcum*".
" 608, line 17, for "*Sternochetus*" read "*Sternochaetus*".
" 610, Add to the list: "*Vespa occidentalis* Cresson (Hym.) 455.

ERRATA

The following typographical errors, etc., which escaped the proof-reader, have been noted, and corrections should be made in the text:

Page 2, line 5 from bottom: for '*australiae*', read '*americanum*'.
" 4, line 3: for 'Aculate', read 'Aculeate'.
" 4, line 7: for '*sandwichensis*', read '*sandwichiana*'.
" 19, line 29: after 'seeds', insert 'of *Adenanthera pavonina*'.
" 25, line 29: for 'Though', read 'No'.
" 34, line 1: omit 'group of'.
" 35, line 19: for '*Mystroconemis*', read '*Mystrocnemis*'.
" 42, lines 10, 11: for 'Hydrophillid', read 'Hydrophilid'.
" 55, line 29: place a period between '*Epyris*' and 'Bridwell'.
" 59, line 30: for 'on', read 'an'.
" 72, line 14: for 'through', read 'three'.
" 72, lines 29 & 30: belong to the paper ending on page 71.
" 86, line 36: for 'transmission', read 'transition'.
" 77, line 23: for 'general', read 'genera'.
" 80, line 2: for 'acuate', read 'arcuate'.
" 96, line 22: for 'throax', read 'thorax'.
" 99, line 24: for '*Lipocchacta*' read '*Lipochacta*'.
" 99: omit paragraph lines 28 to 32.
" 99, line 4 from bottom: insert 'on *Raillardia menziesii*', before 'which'.
" 100, line 16: for 'later', read 'lateral'.
" 100, line 37: for 'specimen', read 'specimens'.
" 103, line 33: for 'recahing', read 'reaching'.
" 108, line 5: place a period after '*I*'.
" 165, line 11: remove parentheses.
" 165, line 12: for 'Amr.', read 'Ann.'.
" 178, line 15: for 'is', read 'in'.
" 180, line 15: for 'continued', read 'contained'.
" 180, line 21: for 'Samoan', read 'Samoa'.
" 181, line 16: for '*oblusata*', read '*obtusata*'.
" 195, line 7: for 'parsite', read 'parasite'.
" 195, line 24: for '*peregina*', read '*peregrina*'.
" 198, line 19: for 'scorbes', read 'scrobes'.
" 199, line 23: for 'scorbes', read 'scrobes'.
" 202, line 4: for 'elonagte', read 'elongate'.
" 212, line 37: for 'on', read 'one'.
" 214, line 4: for 'that', read 'than'.
" 216, line 24: for 'closely', read 'close'.
" 218, line 25: for 'moderatel', read 'moderately'.
" 221, line 3 from bottom: for 'hast', read 'host'.
" 225, line 3: insert 'of' after 'larvae'.
" 227, line 20: for '88', read '.88'.
" 228, line at bottom belongs at top.

VOL. IV., NO. 1. JUNE, 1919.

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1918

HONOLULU, HAWAII

PRICE 50 CENTS

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Cooke, J. P.
Crawford, D. L.
Ehrhorn, E. M.
Fullaway, D. T.
Giffard, W. M.
Grinnell, F.
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*Koebele, A.
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*Sharp, D.
Swezey, O. H.
Tenney, E. D.
Timberlake, P. H.
Wilder, G. P.
Willard, H. F.
Williams, F. X.

*Honorary members.

All correspondence should be addressed to the Secretary, Hawaiian Entomological Society, Honolulu, Hawaii, from whom copies of the Proceedings may be purchased.

Volume I of the Proceedings, for 1905-07 (in five numbers), contains 210 pages, 4 plates and 5 text figures.

Volume II, 1908-12 (in five numbers), contains 311 pages, 7 plates, 5 cuts and 1 portrait.

Volume III, 1913-1917 (in five numbers), contains 500 pages, 8 plates and 6 cuts.

Price per volume, $2.00. Price of any single number, 50 cents.

PROCEEDINGS

OF THE

Hawaiian Entomological Society

Vol. IV, No. 1. For the Year 1918. June, 1919.

JANUARY 3rd, 1918.

The one hundred forty-eighth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs Bridwell, Crawford, Ehrhorn, Fullaway, Mant, Swezey, Timberlake and Willard.

Minutes of previous meeting read and approved, with corrections.

ENTOMOLOGICAL PROGRAM.

Lepidoptera from India.—Mr. Mant exhibited a collection of Lepidoptera from Sikkim, India, including one specimen from Aru.

Vanessa tammeamea.—Mr. Swezey reported seeing a Kamehameha butterfly in his garden at Kaimuki. The insect seldom comes down from the mountain forests where its native food-plant (*Pipturus*) grows.

Pantala flavescens.—Mr. Pemberton reported finding a specimen of this dragonfly 15 miles from land in the channel between Oahu and Molokai.

Phora sp.—Mr. Pemberton exhibited a series of a Phorid fly bred from decaying pineapples.

Sicrola from Fiji.—Mr. Bridwell reported finding a species

of *Sicrola* among material collected in Fiji by Mr. Muir. There are no previous records of the genus in Fiji.

Epyris extraneus in the Philippines.—Mr. Bridwell reported finding this Bethylid in material collected by Mr. Muir in the Philippines. The species was recently described by him from examples collected in Honolulu.

Margaronia exauda.—Mr. Fullaway reported breeding this moth from *Ochrosia* at the Government Nursery.

Lindorus lophanthae.—Mr. Fullaway gave notes on the egg-laying habits of this lady-beetle, which oviposits beneath the scale of *Phenacaspis eugeniae.*

Maui Insect Notes.

BY O. H. SWEZEY.

Dec. 18 to 21, 1917, were spent on Maui sugar plantations investigating leafhopper conditions. At the same time the following insects exhibited were noted and collected, being the first record of their capture on the Island, except in case of the last three.

Epyris extraneus. Two specimens of this recent immigrant were taken, each was on a cane leaf, one at Puunene and the other at Wailuku.

Opisthacantha dubiosa. One specimen taken on a cane leaf at Lahaina.

Pseudogonatopus hospes. Leafhoppers parasitized by this Dryinid were observed in canefields at Puunene, Wailuku and Lahaina. Some cocoons were also found on the leaves.

Helegonatopus pseudophanes. Reared from *Pseudogonatopus hospes* cocoons at Puunene.

Saronotum australiae. Reared from cane leaves collected at Olowalu. Undoubtedly from a Dryinid cocoon on one of the leaves.

Bruchus pruininus. Seven specimens taken on flowers of *Lucaena glauca* at Kihei, Wailuku and Lahaina.

Heterospilus prosopidis. One specimen taken on a cane leaf at Wailuku. It is the introduced parasite on the above Bruchid.

Diachus auratus. Six specimens taken on flowers of *Leucaena glauca* at Lahaina.

Calandra linearis var. *striatus.* Several dead specimens in old tamarind pods at Lahaina.

Schistoceros cornutus and *Sinoxylon conigerum.* Both these beetles found in the branches of a dying Hibiscus in a hedge at Wailuku.

Catorama mexicana. One specimen in tamarind pod at Lahaina.

FEBRUARY 7TH, 1918.

The one hundred forty-ninth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Bridwell, Crawford, Fullaway, Giffard, Maut, Swezey, Timberlake, Wilder, and Williams.

Minutes of previous meeting read and approved.

NOTES AND EXHIBITIONS.

Bruchus pruininus.—Mr. Bridwell gave some notes on the habits of this beetle in Honolulu. Mr. Swezey reported having collected it last year at Chico, California, where it breeds in the seeds of the black locust.

Halobates sp.—Mr. Pemberton reported again finding this marine bug numerous along the beach at Waikiki during a heavy "kona" storm. They appear, according to his observation, only when the wind blows steadily from the south for two or three days.

Samoan Insects. Mr. Giffard exhibited a small lot of insects from American Samoa, collected by Dr. H. C. Kellers,

U. S. N., and transmitted by Governor Poyer. It included moths, butterflies, phasmids, dragonflies, and roaches; also a few Aculate Hymenoptera collected by Professor R. W. Doane at Apia, British (formerly German) Samoa.

Plutella maculipennis.—Mr. Swezey exhibited a series of this moth bred from the pods of *Capparis sandwichensis* collected on a rocky ledge a little east of Diamond Head. The series presented variations.

Ceratitis capitata.—Mr. Swezey reported breeding seven adult Mediterranean fruitflies from a fruit of *Capparis sandwichiana*, from the same locality as above. It is the first record of this being a host plant for this fly.

Chelonus blackburni.—Mr. Swezey reported on some observations made by him on the habits of this Braconid which indicate that it has similar habits to *C. texanus,* the biology of which was published by Pierce and Holloway in the Journal of Economic Entomology, V, p. 425, 1912. He observed the adults of *Chelonus* flying about an *Amarantus* plant on which *Hymenia recurvalis* was breeding, and saw them apparently ovipositing in the *Hymenia* eggs. Of 11 eggs collected from the plant, only one went thru to maturity and produced a moth. Seven were destroyed by an egg-parasite (*Pentarthron flavum*), and two hatched caterpillars which nearly reached their full growth, spun cocoons, then were devoured by the Braconid larva which had developed inside each of them. On account of being disturbed, the larvae failed to make cocoons and did not mature, tho they developed far enough to be recognized as *Chelonus*, and thus demonstrates the similarity of its life-history to that of *C. texanus* and perhaps other species of *Chelonus.*

Nests of Philippine Wasps.—Mr. Williams exhibited the peculiar nests of certain solitary wasps found in the Philippine Islands, and gave notes on the habits of the builders.

Calligaster sp.—A large nest of several cells covered with leaves. The egg is placed in the middle of the side of the cell, not suspended. The larva is active and is fed from day to day.

Ischnogaster sp.—Forms a link between Vespids and Eumenids. Young fed with nectar. Hair fungus attached to nest.

Ischnogaster sp.—Nest made of decayed wood and very fragile.

Ischnogaster sp.—Pedicel of nest with antguard.

A species of *Vespa* goes around breaking down these nests.

Serangium maculiferum and *Cyrema nigellum*. Mr. Fullaway stated that the small black Coccinellid occasionally taken here is known under these two names but there appears to be but one species, for which the first name should be used.

Fruitfly control.—In a discussion of the present state of fruitfly control, Mr. Giffard reported that in Honolulu a great deal more sound fruit is being obtained at present than for some years past, and that he was positive that musk melon crops were ruined by the melonfly as early as 1881, although the fly was not reported here until 1897.

MARCH 7TH, 1918.

The one hundred fiftieth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Crawford, Ehrhorn, Fullaway, Giffard, Kuhns, Swezey and Timberlake.

Minutes of previous meeting read and approved with corrections.

Chalcolepidius erythroloma.—Mr. Swezey exhibited an apparently nearly full-grown larva of this large Elaterid beetle which he had found in a dead, partially rotten tree trunk of *Maba sandwicensis* on Niu Ridge, February 10th, 1918. There were termites and lepidopterous larvae in the same tree. Some of the termites were placed in a tin box with the beetle larva and after a day or two were found to have all been eaten. Since then, it has been fed with the larvae of *Adoretus,* eating two or three daily. Thus the predacious habit of this Elaterid is proven.

Capua n. sp.—Mr. Swezey exhibited 6 specimens of a Tortricid moth reared from larvae found on the leaves of *Reynoldsia sandwicensis* in Niu Valley, February 10th, 1918, which is an undescribed species not previously collected.

Thecla echion.—A specimen of this butterfly was exhibited by Mr. Swezey, bred on egg-plant. The larvae were found on the leaves and in the fruit, February 5th. Three butterflies were reared from the material gathered. The species is one of the two species of butterflies introduced from Mexico to feed on Lantana. In 1908, Kotinsky reported having bred one of these butterflies from pepper pods (Proc. Haw. Ent. Soc. II, p. 36, 1909). It may possibly have been this species.

Nesosydne leahi.—Mr. Giffard reported that he and Mr. Fullaway in collecting on Diamond Head slopes, February 24th, 1918, had discovered the macropterous form of this Delphacid.

California Hemiptera.—Mr. Giffard exhibited a collection of Central Californian Homoptera and Heteroptera made by him during the summers of 1916 and 1917, and determined and catalogued by Mr. E. P. Van Duzee in the Proceedings of the California Academy of Sciences, 4th series, Vol. II, No. 11, pp. 249-318, Dec. 31, 1917. The collection enumerates 355 species in all, including a few forms taken by Mr. Gif-

fard in the Sierras, Oregon and Washington. Included in the above, Mr. Van Duzee has described 47 new species. The collection exhibited includes series of a large majority of the species enumerated together with allotypes and paratypes of the new species. All holotypes are in the collections of the California Academy of Sciences.

Ithamar n. sp.—Mr. Swezey exhibited a specimen of bug collected on Niu Ridge, February 10th, 1918, which is undoubtedly a new species of this genus, or a closely related one.*

APRIL 4TH, 1918.

The one hundred fifty-first meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Crawford, Ehrhorn, Fullaway, Giffard, Kuhns, Osborn, Pemberton, Swezey Timberlake and Willard. Mr. Van der Goot of Buitenzorg, Java, was a visitor.

Minutes of previous meeting read and approved.

Mr. Joseph Rosa was elected to active membership.

NOTES AND EXHIBITIONS.

Coniocampsa vesiculigera.—Mr. Swezey exhibited five specimens of this Coniopterigid collected by him March 17th at Ewa by sweeping on *Euphorbia* bushes. He stated that he had collected a few specimens at his place in Kaimuki in 1914, which was the first record of its capture in Hawaii.

Pipunculus sp.—Mr. Timberlake exhibited a Pipunculus fly captured March 25th on the window at the Sugar Planters' Experiment Station. It is thought to be the first record of the capture of a Pipunculus in the city of Honolulu, they customarily remaining in their natural habitat in the mountain forests.

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* The same species was taken by Mr. Bridwell at the Nuuanu Pali on *Euphorbia*, June, 1917, and later on *Euphorbia* in Iao Valley, Maui, 1918, by Swezey and Bridwell.

Cerotrioza birittata.—Mr. Swezey exhibited a specimen of this Psyllid collected by him on Mt. Tantalus, March 29th. This insect has been collected but a few times, first at Opaeula, next at Niu, and now on Tantalus. In each case but a specimen or two were taken, and always on *Xylosma Hawaiiense.*

Herahera sp.—Mr. Swezey exhibited specimens of a Psyllid bred from nymphs on *Pelea* leaves from Mt. Tantalus. The nymphs resembled Aleyrodids, and were not in galls the same as other species of *Herahera* occurring on *Pelea.* Instead they were situated in slight depressions on the surface of the leaf.

Notes on Java Insects.—Mr. Van der Goot spoke some on insect collecting in Java. He exhibited specimens of a queer Coccid which climbs on the backs of ants and is thus transported by them. He referred to the chief agricultural insect pests in Java: scale insects, caterpillars, and white grubs He stated that the leafhoppers were not injurious to sugar cane, the most important cane pest being the moth borer.

MAY 2ND, 1918.

The one hundred fifty-second meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Crawford, Ehrhorn, Fullaway, Giffard, Kuhns, Rosa and Swezey.

Minutes of previous meeting read and approved.

On account of the Treasurer reporting lack of funds sufficient to pay the printing bill for the 1917 Proceedings, Mr. Giffard was appointed a committee to seek financial assistance from the Hawaiian Sugar Planters' Association. It was voted that a bound copy of Vol. III of the Proceedings be procured and presented to the Trustees of the Association.

PAPER.

Insects Occurring on Plants of Lobelioideae in the Hawaiian Islands.

BY O. H. SWEZEY.

The species of this family are not much attacked by insects. Those which do attack them are not particularly injurious to the plants. The fact that so few insects attack the Lobelioideae accounts for there having been less special attention given to collecting insects from these plants than to many others which yield insects in greater numbers.

Some of the insects mentioned below may be specially attached to their respective plants, not having been reared from others; but the records are altogether too meager to state with certainty until more observations are made. The following list is made up from the records of several entomologists: Dr. Perkins, Messrs. Giffard, Swezey, Timberlake and Bridwell.

These records are almost entirely from collecting on the Island of Oahu. If special collecting should be done on the Lobelioideae on the other islands no doubt many more species could be added to the list.

HYMENOPTERA.

Family Braconidae.

Microdus hawaiicola. Bred from *Thyrocopa* sp. in dead stem of *Clermontia.*

A Figitid has been collected on *Rollandia.* It was probably parasitic on a Drosophilid.

LEPIDOPTERA.

Family Gelechiidae.

Thyrocopa sp. This moth has been reared from larvae in dead stems of *Clermontia.*

Family *Carposinidae*.

Heterocrossa oliraceonitens. This moth has often been reared from larvae in the fruit and flower buds of *Clermontia kakeana*. It has been reared also from various other kinds of fruits.

Heterocrossa gemmata. This moth has been reared from the flowers and fruit of *Rollandia*, and from the fruit of *Clermontia*.

Heterocrossa crinifera. This species occurs as a leaf-miner in *Rollandia Humboldtiana*.

Heterocrossa sp. An undetermined species reared on one occasion from larva boring in stem of *Cyanea*.

Family Hyponomeutidae.

Neolysia sp. Reared from larvae in dead stems of *Clermontia*.

Hyperdasys cryptogamiellus. This moth was reared from a larva in the dead stem of *Clermontia*. It has been found in dead wood of other kinds as well.

Family Tineidae.

Opogona aurisquamosa and *O. apicalis*. Reared from larvae in dead *Clermontia* stems.

DIPTERA.

Family Agromyzidae.

Agromyza sp. On a few occasions the leaves of *Clermontia persicifolia* have been found mined with the larvae of a fly, but none reared to maturity.

Larvae of some fly have been found in young shoots of *Clermontia parviflora* on Hawaii. Perhaps some Drosophilid or other scavenger.

HEMIPTERA.

Family Delphacidae.

Nesosydne blackburni. This leafhopper has been taken on *Clermontia parviflora*, on Hawaii, but it usually occurs on other plants.

Nesosydne pseudorubescens. This species has also been taken on *Clermontia parviflora*, tho it usually occurs on koa.

Nesosydne lobeliae and *N. montis-tantalus* occur on *Lobelia hypoleuca.*

Nesosydne timberlakei has been taken on *Cyanea truncata.*

Nesosydne wailupensis has been collected on *Rollandia crispa.*

Nesodryas giffardi has been collected in abundance on *Rollandia crispa.*

Family Tettigoniidae.

Nesophrosyne spp. Several species of these leafhoppers have been collected from different Lobelioideae, but they are as yet undetermined.

Family Miridae.

Several species of plant bugs have been collected from Lobelioideae, but they are as yet undetermined.

Family Anthocoridae.

A bug of this family has been taken in hollow dead stems, where in search of prey.

Family Coccidae.

Saissetia hemispherica. Has been found on *Clermontia parviflora* on Hawaii.

COLEOPTERA.

Family Carabidae.

A few of this family are sometimes found hiding or in search of prey in the hollow dead stems of *Clermontia.*

Family Nitidulidae.

Orthostolus robustus, and other beetles of this family are often found very numerous in the flowers and decaying fruits of many if not all species of Lobelioideae. Some are also found in decaying bark of the dying stems.

Family Proterhinidae.

An undetermined species of this family has been reared from larvae in dead *Clermontia* stems. There may be other species also.

Family Scolytidae.

A species of this family has been taken in dead *Clermontia* stems.

Family Curculionidae.

Dryophthorus crassus. This large Cossonid beetle has been taken in abundance in dead *Clermontia* stems.

Oodemas sp. has been taken in similar situations as the above.

ORTHOPTERA.

Family Gryllidae.

Prognathogryllus alatus and *P. stridulans*. These peculiar crickets and other allied species are often found hiding in hollow dead stems of *Clermontia* and other Lobelioideae.

THYSANOPTERA.

Heliothrips haemorhoidalis. Has been collected on *Clermontia parviflora* on Hawaii.

Notes and exhibitions.

Pipunculus sp.—Mr. Rosa exhibited puparia of a Pipunculus fly obtained from leafhoppers on sugar cane at the H. S. P. A. Experiment Station grounds, undoubtedly the same species that was exhibited by Mr. Timberlake at the last meeting.

caught by him on the window at the Experiment Station. Mr. Timberlake stated that the species is near to *P. terryi* of Kauai.

Halymnococcus(?) sp.—Mr. Ehrhorn exhibited the seeds of a branching palm from Egypt which bore specimens of a peculiar Coccid secreting itself under the bracts of the seeds and resembling a sea shell. It probably belongs to the genus *Halymnococcus*. A similar scale has been found on seeds of the native palm (*Pritchardia*) in Hawaii.

Deilephila calida.—Mr. Swezey reported that he and Mr. Bridwell had observed one of these moths at *Metrosideros* blossoms in the daytime on Wailupe Ridge, April 21, 1918.

Cremastus hymeniae.—This Ophionid was first recorded by Marsh in 1910, he having bred it from *Hymenia recurvalis*. Mr. Swezey gave the following list of hosts at present known to him: *Hymenia recurvalis*, *Nacoleia accepta*, *N. blackburni*, *N. monogona*, *Phlyctaenia calcophanes*, *P. platyleuca*, *Phlyctaenia* n. sp. (on *Campylotheca*), *Heterocrossa graminicolor*, *Cryptophlebia illepida*, *Tortrix metallurgica*, *Bactra straminea*, *Batrachedra cuniculator*, *Petrochroa dimorpha*, *Pyroderces rileyi*, *Eremetis flavistriata*. A total of 15 species.

Coptotermes.—Mr. Crawford reported this termite having been taken by Prof. Young destroying boxes in a warehouse near the waterfront.

Cryptotermes.—Mr. Crawford reported this termite as taken at the same time as the above destroying shooks in the bundle.

Xyleborus sp.—This Scolytid reported by Mr. Crawford attacking living wood of a monkey-pod tree in Manoa Valley.

Hypothenemus eruditus.—Mr. Crawford reported having bred this Scolytid from twigs of *Amherstia nobilis* last March. The beetles bored thru the central axis of living terminal twigs, killing new growth. The same species was very abundant in dead branches of a monkey-pod tree.

Psyllid types.—Mr. Crawford reported that the types in a

collection of Hawaiian Psyllids of Mr. Giffard's which he had been working up have been turned over to Mr. Giffard who in turn will place them in the Collection of the Hawaiian Entomological Society. The list is as follows: *Trioza lanaiensis, T. pullata, T. hawaiiensis, Heraheva hyalina, H. giffardi.* The stipulation by Mr. Giffard was that his types should not leave the Territory, altho the Society might itself provide for their disposition in case it could no longer care for them. The remaining of Mr. Crawford's species of Hawaiian Psyllidae have also been turned over to the same collection.

Potassium cyanide inoculation.—Mr. Crawford called attention to a note in Science, page 344, April 5, 1918, in regard to killing Coccidae by inoculating potassium cyanide into trees. He also made some remarks on the very extensive work on Philippine insects and fungi by C. F. Baker, Dean of the College of Agriculture, University of the Philippines.

JUNE 6TH, 1918.

The one hundred fifty-third meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Ehrhorn, Fullaway, Giffard, Rosa, Swezey, Timberlake, Willard and Williams.

Minutes of previous meeting read and approved.

Mr. Giffard as committee on seeking financial assistance, reported that he had received favorable response from the Trustees of the Hawaiian Sugar Planters' Association. A vote of thanks was extended to Mr. Giffard for his efforts on behalf of the Society.

Committee on Exchanges presented a list of institutions with whom it was considered desirable to offer exchange of publications. It was voted that the Secretary address a letter to each institution inviting an exchange of publications.

PAPERS.

Some Additional Notes on Bruchidae and Their Parasites in the Hawaiian Islands.

BY JOHN COLBURN BRIDWELL.

1. Bruchus sallaei, Sharp, Another New-Found Immigrant.

Acacia farnesiana is one of the immigrant leguminous plants which has found the Hawaiian climate and soils peculiarly well adapted to its needs and is now very widely distributed in the dryer lowlands and lower hills to an elevation of about five or six hundred feet. It is a troublesome spiny shrub which since the time Dr. Hillebrand wrote his account has occupied large areas of pasture lands. In the *Flora* he speaks of it as having occupied areas in the vicinity of the Pearl River Inlet. Its spread is not easy to account for, since the seeds, as large as small peas, do not appear to have any particular means of distribution. It seeds very freely but is attacked by several species of insects which live in the pods and at least three of these are of considerable importance in destroying the seeds. *Cryptophlebia illepida* attacks the pods before the seeds harden and later enters and devours a very large part of the ripening seeds, each larva destroying several seeds. *Myelois ceratoniae* feeds in the pods in much the same way. Several other moths and three or four species of beetles feed in the pods which have been injured in this manner but apparently play no part in the destruction of the seeds. The Bruchid *Caryoborus gonagra* enters the pods from eggs laid on the surface and each larva may destroy one or more seeds. These beneficial attacks have been familiar to all Hawaiian entomologists. Having occasion on May 30, 1918, to examine some of these pods to secure material for the study of *Caryoborus gonagra*, I was interested to find the pods containing another Bruchid closely resembling *Bruchus prosopis* in considerable numbers in the Punchbowl district of Honolulu.

Upon examination this proved to be *Bruchus sallaei* Sharp (Biologia Centrali Americana, Coleoptera 5:475, 1885) previously known from Texas, Mexico and Central America. It is the nearest North American ally of *Bruchus prosopis* and would run to that species in my table of Hawaiian Bruchidae (Proc. Hawn. Ent. Soc. 3:466-468, 1918). It may be distinguished by the much shorter scutellum and by the transverse glabrous impunctate area above the eyes. In *B. prosopis* the scutellum is longer than broad while in *B. sallaei* it is broader than long.

While closely allied to *B. prosopis* and like that species possessing an elongate ovipositor in the female, its egg-laying habits are markedly different. Cushman in his admirable "Notes on the Host Plants and Parasites of North American Bruchidae," (Jour. Econ. Ent. 4:489-510, 1911) has described the egg and recorded as breeding from *Acacia farnesiana*, *Acacia amentacea*, and *Gleditsia triacanthos* in Texas and recorded it as the host of a large number of parasites. He records it as ovipositing on the pods and I have secured oviposition also upon the seeds. The eggs resemble those of *Caryoborus gonagra* but are smaller, and narrower and tend to be laid in groups of 2-5 partly overlapping. Each larva feeds at the expense of a single seed and practically destroys the seed in its development. It pupates within the seed without making any apparent cocoon and the adult emerges by gnawing away a circular disc of the seed coat. Adults placed in confinement with the pods of *Prosopis juliflora* fed upon the sweet substance of the pulp and oviposited though not very freely upon the pods. From these eggs developed in due time small adults. Whether the species will utilize algaroba pods for breeding in the open under natural conditions remains to be seen.

If *Oscana semifumipennis* is an American insect it is not improbable that it reached the Islands with this species since its eggs are parasitized by it.

This Bruchid has so far only been found on the slopes of

Punchbowl though no adequate effort has been made to find it elsewhere.

2. Bruchus obtectus Say under Another Name.

Alfken (Zoöl. Jahrb. Abt. Syst. 19:572, 1904) reports *Mylabris (Bruchus) mimosae* Fab. as found by Schauinsland at Pearl Harbor during a voyage in the Pacific in 1896 and 1897. This name was formerly incorrectly, as it is now believed, applied to *Bruchus obtectus* Say. Unless the determination was erroneous then the common bean weevil was here as early as 1897. Possibly, however, the specimens may have been *Bruchus prosopis*.

3. Bruchus prosopis.

Adults emerged May 14, 1918, from eggs secured experimentally in pods of *Prosopis juliflora* between Dec. 27, 1917, and Jan. 4, eggs having been certainly laid on the first date. This gives at least 130 days from egg to emergence of adult. The emergence of the adults was perhaps retarded by the dry condition in which the seeds were kept. This is much the longest period observed for the development of Bruchidae in Hawaii.

4. The Dolichos Weevil Identified.

Specimens of the Dolichos weevil transmitted to Dr. Howard for determination were identified by Mr. E. A. Schwarz as *Pachymerus phaseoli* (Gyllenhal)=*Bruchus phaseoli* Gyllenhal (in Schoenherr Gen. Curc. 1:37, 1833). The species was originally described from Brazil and has been reported as introduced into France and Italy. Whether its host plants have been previously reported the literature at hand does not permit me to ascertain. Probably it has spread with its host plant and is not indigenous to Brazil, which is not rich in legumes related to *Dolichos*.

5. Bruchus pruininus.

This species has been bred experimentally from the following additional hosts: *Cassia siamea*, *Samanea saman*, *Acacia decurrens*, *Sesbania coccinea*, and *Cassia grandis*.

Breeding this from the seeds of the monkeypod (*Samanea saman*) is of interest since we have no local record of this species being attacked by Bruchidae, the seeds being protected by the chambered pods with a gummy or syrupy content.

The seeds of *Cassia nodosa* have a copious albumen and the cotyledons reach the seed coat only along their edges. When the eggs are laid immediately over the cotyledons the larvae are able to penetrate into them and develop. When they are placed over the albumen the larvae are unable to penetrate this and perish.

I have retained a lot of infested seeds of *Sesbania sesban* in which this species was breeding for more than a year and the generations have followed one another until the seed are all practically destroyed. There is then no doubt that the species can maintain itself in storage indefinitely.

6. Bruchus quadrimaculatus.

This species was observed on Maui attacking cowpeas in the field. It is a most serious enemy of the cowpea and pigeon peas in storage but does not appear to attack the latter in the field on Maui.

7. Caryoborus gonagra.

A larva of this species successfully completed its growth during February, 1918, in a pod of *Cassia nodosa* by proceeding from one withered undeveloped seed to another.

8. The Two-Spotted Bean Weevil Identified.

As was suggested this species proves to be *Spermophagus pectoralis* Sharp according to the determination of Mr. Schwarz.

9. Parasites of Bruchidae in Storage

The practical unimportance of parasites in the control of Bruchidae in stored products was illustrated by conditions in Maui. On account of the shortage of labor due to the war some beans, cowpeas and pigeon peas had been neglected and the latter were heavily infested with *Bruchus quadrimaculatus*. They were so numerous that thousands of the adults were sifted out and practically every one of the cowpeas and pigeon peas stored in loose burlap bags had been destroyed, yet the parasites—principally the Pteromalid supposed to be "*Pteromalus*" *calandrae*—were also present by the thousands. They are, however, important in reducing the numbers of Bruchidae which emerge from the stored products to scatter and infest the stores elsewhere. Properly fumigated cowpeas and pigeon peas, however, which had only the protection of muslin bags were free from Bruchids.

10. Chaetospila elegans Westwood.

This species was taken at Grove Farm Mill, Haiku, Maui, and in part bred out under conditions which make it certain that it parasitizes both *Calandra oryzae* and *Bruchus quadrimaculatus*.

The male as yet undescribed has the antennae 10-jointed. In both sexes wingless and fully winged forms occur with all the intermediate stages between, the degree of wing reduction often differing in the wings of the same specimen.

This feeble species seems of no importance in controlling its hosts.

11. Uscana semifumipennis Girault.

Out of 5,000 seeds picked up principally in Thomas Square in the heart of Honolulu, 3,000 bore eggs of *Caryoborus gonagra* but only six of the larvae reached maturity. Parasitization of the eggs by the Trichogrammatid, *Uscana semifumipennis* Girault seemed to be by far the largest death factor.

On a small lot of pods of *Acacia farnesiana* upon which the eggs of *Caryoborus gonagra* had been deposited in large numbers, taken at Waialua, Oct. 4, 1918, only about 50 per cent of the eggs had been parasitized, leaving enough larvae of the Bruchid to practically destroy the pods. The reason for this smaller percentage was perhaps due to the fact that in this district the only host plants for the Bruchid were *Acacia farnesiana* and *Prosopis juliflora* and these ripen their seed in particular seasons, so that the species does not have continuous breeding places throughout the year and the parasite has a correspondingly limited opportunity for multiplication.

12. Credit Where Credit is Due

The paper in last year's Proceedings, pp. 465-505, was prepared for publication under the pressure of wartime duties in connection with the Selective Service and in the haste of finishing up, it was finally published without recognition of the assistance given me in the preparation of the plant list by Dr. H. L. Lyon, Mr. J. F. Rock and Mr. E. L. Caum. This oversight was particularly regretable since unintentionally certain plants were there first recorded as growing in the Hawaiian Islands. The identifications of all the weedy *Cassias* were made by Mr. Rock.

13. A Correction.

In the discussion of the oviposition reflexes in the former paper on Bruchidae, I had occasion to discuss the habits of a South African Ichneumonid parasitizing *Sarcophaga*. This was referred to under the name of *Allotypa* sp. This is an error. The insect is described elsewhere in this number of these Proceedings as *Atractodes mally'*.

Some Notes on Hawaiian and Other Bethylidae (Hymenoptera) with Descriptions of New Species.

BY JOHN COLBURN BRIDWELL.

1. Perisierola emigrata Rohwer

This species has been previously known as a predator upon the Pink Bollworm (*Pectinophora gossypiella*), having been bred from that species by Mr. Fullaway in 1911 and later by Swezey, Busck, Timberlake, Pemberton and Willard. On May 30, 1918, while examining pods of klu (*Acacia farnesiana*) I found it abundantly associated with the lepidopterous larvae feeding there. Here were found *Cryptophlebia illepida*, *Myelois ceratoniae*, *Pyroderces rileyi*, and *Ereunetis minuscula*. Of these the two former were found attacked under natural conditions while the latter was readily attacked when confined with *Perisierola* and eggs were laid upon the paralyzed larva. *Cryptophlebia* and *Myelois* when full grown are usually too powerful for the *Perisierola* and destroy her with their mandibles when attacked. The smaller ones are, however, usually mastered. The female stings them in three places, in the head region at the throat, and near the middle and at the anal extremity ventrally. Each operation results in violent struggles of the larva during which the *Perisierola* hangs on desperately by means of her mandibles, middle and hind legs and by curving her body tightly about the caterpillar. When one portion of the body is mastered she manipulates portions of it apparently with the object of feeding on its juices.

Oviposition was not observed but apparently takes place an hour or two after she has mastered the larva. The eggs are long elliptical nearly or quite three times as long as broad. They are usually laid flat against the body with their length parallel with it. The number laid seems to bear some proportion to the size of the caterpillar, two eggs having been laid on the little *Ereunetis* larva while eight is a common number

to be placed on the larger caterpillars of *Cryptophlebia* and *Myelois*.

In captivity when placed with other caterpillars the *Perisierola* will attack almost any others besides these. In this way it was bred experimentally from *Ephestia elutella* and *Crocidosema lantanae* and it oviposited upon larvae of *Amorbia emigratella* and *Ereunetis minuscula*. The adults also mastered young Noctuid larvae, the young larva of *Scotorythra rara* and *Hymenia recurvalis*, the larva of *Archips postrittanus* and of *Adenoneura rufipennis*, and the grubs of the Anthribid beetle *Araecerus fasciculatus* and the Bruchid *Caryoborus gonagra*. Upon all of these the adults fed, manipulating the larvae with their mandibles and sucking their juices. If several adults were placed with a small larva they did not oviposit but fed upon them until they were sucked dry.

One female placed with a half-grown larva of *Cryptophlebia* which had already been paralyzed on the evening of May 30 had by the next day laid eight eggs upon its dorsal surface. By June 3rd the larvae hatched from these had practically consumed the caterpillar and had reached full growth.

The larva of *Pyroderces Rileyi* was observed vigorously attacking a *Perisierola* placed with it, using its mandibles to bite the abdomen of the wasp. One bit a small *Sclerodermus* placed with it so viciously as to stun it and several with which some *Sierola* had been placed destroyed most of them in a night. Several *Perisierola* placed with a mixed lot of caterpillars from klu pods were destroyed overnight and I have repeatedly had the same thing happen with *Sierola* and *Sclerodermus* placed with other lepidopterous larvae. Lepidopterous larvae do not submit tamely to the attacks of Bethylidae but fight gamely if they have any opportunity.

The Bethylids are cautious in attack and it is probable they frequently attack during the quiescent period at the moults of the caterpillars and thus avoid danger of injury. One female was observed attacking the slender larva of *Ereunetis*. After investigating the head and biting at it and possibly stinging, she

pounced upon its middle and stung it there. This resulted in vigorous contortions of the caterpillar particularly of the anal end. Later she returned to feed at the wound inflicted by the sting. She afterward began working about the thoracic region and apparently succeeded in inflicting a ventral sting near the middle legs after several apparently fruitless efforts in the head region she proceeded to the anal region, where her efforts to sting created another great commotion and contortions, during which she hung on by use of her legs and mandibles and made many attempts to sting but apparently unsuccessfully. She then returned to the head and made several efforts to sting there both dorsal and ventral. The struggles seemed to exhaust her but she remained with the larva which became quiescent. Two hours later she had deposited two eggs.

A female placed with the grub of *Araecerus fasciculatus* after a time attacked it vigorously, the grub making the most violent contortions in its attempts to dislodge the *Perisierola*. She had attacked it at the anal extremity and was keeping hold with her mandibles and hind legs and was constantly attempting stinging. Both finally became exhausted and when the grub was becoming quiescent the *Perisierola* attempted to pierce the skin of the mid-ventral region and apparently succeeded and fed and then rested for some time on the grub now straightened out on its back. From time to time she would abandon the grub and run away, but always returned.

2. Sierola Attacking the Larvae of Cryptophlebia vulpes in the Young Pods of Acacia koa.

Where the ridge leading from Punchbowl to Mt. Tantalus joins the latter and the sharp ascent up to the Tantalus peak begins there are a number of koa trees upon which I have never failed to find adult *Sierolae* whenever looked for, but until June 23, 1918, I had not been able to find to what lepidopterous larvae they are attached. Sweeping the foliage and opening the young pods of the koa then revealed the presence of four species of *Sierola* upon the *Acacia koa* and one at least

of these is attached to the larva of *Cryptophlebia vulpes* as a predator. This moth lives as a larva in the immature pods of the koa, feeding at the expense of the young seeds. During its development the larvae frequently cut their way out of the green pods and enter fresh ones. They finally pupate in the pods from which they have eaten out the seed. The *Sierola* enters the cavity in which the caterpillar has devoured the seed and oviposits upon the larva after stinging it and stupefying it. The larvae completely destroy the caterpillar and from five to seven of them can find food from one larva. Upon reaching full growth they spin silken cocoons within the empty seed cavity and the adult *Sierolae* emerge about the time the pods begin to ripen and change color. In all the pods where *Sierola* larvae and coccoons were found were openings apparently made by the *Cryptophlebia* larvae in entering one pod from another. While I have not been able to make out the details of the stinging of the *Cryptophlebia* larva, the general aspect of the conflict between them is much like that between *Perisierola* and its prey, the *Sierola* attacking with great fury and hanging to the prey with legs and mandibles. They also feed on the juices of the prey as do the other Bethylidae observed. I have seen no indication that they linger with the prey during the larval development.

The koa pods are also injured by the larvae of *Cryptophlebia illepida* and of *Adenoneura rufipennis*. *C. illepida* is too large to be readily mastered by the *Sierola* but doubtless the larvae are occasionally utilized.

The larvae of the species of *Cryptophlebia* attack the koa pods in a later stage of development than *Adenoneura*. The larvae of the latter emerge from the pods and hide elsewhere to pupate. They are also probably used occasionally by the *Sierola*.

A larva supposed to belong to *C. vulpes* was mastered by the *Sierola* and five eggs laid by June 25. These eggs are elliptical in outline perhaps 2 1/2 times as long as broad and rather large in proportion to the mother insect. They are con-

siderably stouter than the egg of *Perisierola* but are more slender than those of *Sclerodermus manoa*, and *S. immigrans*.

While four species of *Sierola* were represented in the material secured from the koa, only one of these has been surely associated with the *Cryptophlebia* larvae in the pods. Much of the material taken from the foliage of the koa belonged to another species which was taken frequently enough to assure its association with some koa insect but no indication was found as to which one.

Another species of *Sierola* was bred (2 ♀ and 1 ♂) on June 5, 1918, from a lepidopterous larva living within the hollow twigs of recently dead *Clermontia kakeana*.* The material was taken as full fed larvae on May 26, along the Manoa cliffs trail on the side of Tantalus in the S. E. Koolau Mountains of Oahu. These spun their coccoons on May 27. The coccoons are elliptical rich brown in color and are rather closely woven. They lie nearly touching attached to the inner surface of the wood in the pith cavity.

These species of *Sierola* are in the hands of Mr. Fullaway who is revising the Hawaiian species.

3. Sclerodermus immigrans Bridwell.

One ♀ was found on June 11, 1918, at the type locality and on being placed with *Caryoborus* larva showed much interest and attacked it with its mandibles. The details of the attack were not noted at the time but the *Sclerodermus* was seen to gnaw at the larva in the mid-ventral region apparently with the object of starting a flow of juices. There was a marked preference for the active, full-fed larva over the prepupal stage. Though eggs were seen laid up to June 12, but some were laid after that date and the larvae reached full growth, but no adults were bred out from them. This female was kept alive until July 24, being fed exclusively upon the juices of the larvae of *Caryoborus* and other larvae.

* From material of the same origin brought down at the time Mr. Swezey bred *Thyrocopa* sp. and *Neclysia* sp.; he has also bred from similar material *Opogona aurisquamosa* (Butler).

4. Some Endemic Hawaiian Species of Scleroderaius Latreille.

The first species of this genus was described in 1809 under the name of *Sclerodermus domesticus* (Latreille Gen. Crust. & Ins., 4:119 ♀) and the genus described the following year under the same name (Consid. General, etc., 314). It was altered by Westwood in 1839 to *Scleroderma* in which alteration he has been followed by subsequent writers. We here revert to the original spelling believing that emendations, except for names specifically stated by the author to be misprints, are never admissible.

The first species of the genus from the Hawaiian Islands was described by Sir Sydney S. Saunders under the name *Scleroderma polynesialis* (Tr. Ent. Soc. Lond. 1881:116 ♀). In 1901 Ashmead described as new five (Fauna Hawaiiensis 1:283-286) and tabulated the six supposed species. Dr. Perkins in 1910 (*Op. cit.* 2:612-614) added four more species and the present writer in 1918 added an immigrant species (these Proceedings 3:484). All these species with the exception of one of Ashmead's appear to be valid, though they are uncommon and not easily discriminated. In the course of recent years a number of specimens have been taken, and a few bred, some of these appearing to be new. At present I can say but little of the distribution of the species on the various islands since there appear to be but three individuals in the collections here besides those taken on Oahu. Of these one is the immigrant *S. immigrans* Bridwell, the second appears to be *S. polynesialis* Saunders, while the third is distinct from anything known from Oahu.

In the mountains of the Hawaiian Islands are found numerous elongate caterpillars which have the aspect of Cerambycid beetle larvae and have somewhat the same habits usually affecting wood which has reached a condition of white dry rot. These belong to the genera *Semnoprepia*, *Hyperdasys*, and *Hyposmocoma*. Being somewhat difficult to breed in the low-

lands our knowledge of them is somewhat limited. It is from these caterpillars that all our endemic *Sclerodermus* have been bred.

Sclerodermus polynesialis Saunders.

I am unable to distinguish Ashmead's *S. Perkinsi* from this species the supposed differences being apparently due to the difference in the conditions of the specimens, the length of the abdomen and the color of the sutures differing with the condition of the specimen.

If my determination is correct this is the species most commonly found on Oahu and has been frequently bred by the author from wood-boring lepidopterous larvae. I have at hand 19 ♀ of this species, all but one of which were secured in the mountains back of Honolulu, one by W. M. Giffard, one by D. T. Fullaway, two by O. H. Swezey and the remainder by the author. I have also a single ♂ bred out with females of this species. A single ♀ was taken by Mr. Swezey in Iao Valley, Maui. The type locality of *polynesialis* was Mt. Haleakala, Maui.

The species is quite variable in size. The thorax is dark piceous but the coloration of the insect is such that it seems black considerably darker than any other of the species I have seen from Oahu.

There is no trace of ocelli in this species.

Sclerodermus poecilodes Perkins.

There are before me two taken in Waialae Nui, Oahu, by Mr. Swezey and two from Tantalus (Bridwell), both lots associated with larvae supposed to be those of *Semnoprepia*, in the dead stems of *Smilax*.

Sclerodermus kaalae Ashmead.

There is before me a single ♀ which I doubtfully refer to this species in which the head and thorax are piceous, the legs and antennae brownish yellow and the abdomen appears black. The margins of the tergites are testaceous but so closely ap-

plied to the following tergites as to show no difference in color. This resembles *polynesialis* but the clypeus is less produced and the abdomen is distinctly tessellate but more feebly so than the thorax. The head also seems more strongly tessellate than in the other species. There is no trace of ocelli.

One ♀, Mt. Kaala in the Waianae Mts., Oahu (Bridwell).

Sclerodermus manoa n. sp.

♀ This species differs from any wingless female *Sclerodermus* known to me except *semnoprepiae*, by its fully developed ocelli. These are arranged in an acute triangle, the hind ocelli distant from the occipital margin about as far as from the anterior ocellus and about six times that distance from the eye margin.

Testaceous yellow; eyes black, tips of mandibles, sutures of flagellum above, extreme base of first tergite very slightly, sublateral patches on its disc, submedian lateral triangular area on either side the second, and similar basal lateral areas on third and fourth, the sixth entirely and the sixth sternite basally slightly infuscate.

Clypeus produced about as long as broad, tectiform, its apex nearly truncate, simple, the sides sraight.

Head more finely tessellate than the thorax and a little more shining. Thorax subopaque from the strong tessellations, sides of pronotum and of propodeum longitudinally lineolate tessellate; the mesopleura with finer tessellations similar to those of the dorsum. Propodeum distinctly narrowed at base, the declivity obliquely truncate.

Abdomen elongate ovate broader than thorax about as wide as the head, highly polished and shining, the hind margin of the first tergite in the arc of a circle, the tergite not quite as wide as the second, measuring where the suture touches the lateral margins.

Length about 3 mm.

This *Sclerodermus* was found in a cavity in a small stub of white rotten wood, probably the remains of a bush of *Scaevola chamissoniana* along the Manoa cliffs trail in the mountains back of Honolulu on May 26, 1918. It was there associated with a limp immobile lepidopterous larva supposed to be that of a species of *Semnoprepia*. The *Sclerodermus* and the caterpillar were placed in a glass tube and brought in for observation. On the next day she had laid five eggs scattered about on the glass of the tube. The eggs were short ellipsoidal, perhaps twice as long as broad, very large in proportion to the size of the adult, and the poles were very slightly different.

On May 29, only four of the five eggs could be accounted for. One had hatched and the larva was attached to the *Semnoprepia* larva and this one alone of the progeny reached full larval growth and it failed to spin its cocoon and transform. A second larva had hatched and was transferred from the glass but failed to develop; this was true of the third larva as well and the fourth egg was unhatched and did not hatch.

The female *Sclerodermus* showed much interest in the caterpillar, the egg and the young larvae, working over them all with her maxillae and palpi. At one time she appeared to be trying to remove the egg from the glass to the caterpillar. More than once she seemed to be trying to bite into the caterpillar for the young larvae. It seems probable though that she was attempting to feed on the juices exuding from the wound made by the feeding of the young larva. By May 31, three new eggs had been laid and only a single larva remained from the first lot of eggs. This was feeding from the abdomen of the caterpillar just in front of the first pair of prolegs. The effects of the adult *Scleroderm us*' feeding was seen in the shrinking of the caterpillar, which was considerably greater than the feeding of the larva would account for. By June 3 the larva was nearly fullgrown and the eggs had not hatched. The caterpillar was greatly shrunken in the middle as the result of the feeding of the *Scleroderm us* larva. The adult was still living and was removed and placed with a larva of *Cryptophlebia illepida* which had been stung by *Perisierola*. She began to examine the anal extremity of the larva with her mandibles and seemingly finding it too active, since it gave a sharp but slight jerk, she reversed and attempted clumsily and slowly to sting it while straight, a posture well adapted to the natural host caterpillar in its burrow but not for the caterpillar lying free in the tube. This operation was repeated several times in a few minutes.

On June 9 a larva* of apparently another genus but the same wood-boring type was brought from the mountains and

*This larva was injured or partly drowned.

placed on June 10 with the ♀ *Sclerodermus*. She showed great interest in it and attempted stinging it but did not succeed while under observation. Her efforts at this time were more of the type of the *Perisierola* than previously. It is evident that sucking the juices of the larval prey is her means of subsistence. By June 13 three eggs had been laid. The larva from the former lot of eggs which reached full growth failed to spin a coccoon or pupate. The female remained alive from May 26, when she was taken, until June 29 feeding readily upon the juices of any caterpillar given her but ovipositing only upon her natural prey. These were always given her paralyzed as a precaution against injuring her. Had circumstances permitted securing proper food for her and her larvae I have no very great doubt that she might have remained alive much longer and that her young might have been bred through to maturity. She did not even refuse to feed upon the juices of the larva of the Bruchid *Caryoborus gonagra*.

Described from a single ♀. Manoa cliffs trail, Mt. Tantalus, Oahu, Hawaiian Islands, May 26, 1918 (Bridwell). Type in the collection of the Hawaiian Entomological Society

Sclerodermus semnoprepiae n. sp.

♀ Head piceous black; the mandibles piceous, the antennae, thorax, abdomen and legs pale yellow testaceous, flagellum, front coxae and the propleura in front of them and the sutures of the thorax above, sometimes very slightly, petiole, the basal margins of tergites 2-7 seen through the hyaline margins, sting sheath, margins of sternites 2-5 similarly and rest of venter except the last tergite slightly infuscate.

Clypeus triangularly emarginate, the sides not so strongly produced as in *polynesialis*. Ocelli well developed in an equilateral triangle, the posterior ocelli a little further from the eye margin than from the front ocellus and about six times as far from the eye margin.

Head shining tesseliate; dorsum of thorax a little less shining more strongly tessellate; sides of pronotum and propodeum longitudinally, mesopleura, vertically lineolate-tessellate; abdomen with the tergum transversely lineolate-tessellate.

Propodeum similar to that of *manoa* but shorter.

Length about 3.25 mm.

♂ Black; legs and antennae infuscate, the margins of the tergites testaceous; wings subhyaline apically slightly grayish, the veins yellowish translucent.

Antennae 13-jointed, the joints of the flagellum except the last subequal a little broader than long, the last nearly as long as the two preceding joints together. Posterior ocelli about as far from the occipital margin as from the anterior ocellus and about three times as far from the eye margin. Eye about one and one-half its length from the occipital margin.

Pronotum strongly narrowed anteriorly about as long as the mesonotum; mesonotum without furrows; scutellum with a transverse suture at base; propodeum about as long as the scutellum and mesonotum together. Wing with a closed median cell the submedian entirely open behind; transverse median interstitial with the basal, there is no trace of venation beside the subcosta, median, and these, which are well developed. Length 2.5 mm.

Described from 12 ♀ and 7 ♂ bred Dec. 1916 from sticks of the living wood of *Coprosma longifolia* attacked by the larvae of an as yet undescribed species of *Semnoprepia* brought down from the windward side of Mt. Konahuanui, Oahu (O. H. Swezey). The species was ascertained to be a predator upon the larvae of this moth.

Type and allotype ♂ in the collection of the Hawaiian Entomological Society. Paratypes in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

This species is closely related to *manoa* but the dark head will easily distinguish it. The structure of the clypeus is also different.

The undescribed ♂ of *polynesialis* is very similar but in that species the antennal joints are longer, the abdominal markings are more extensively pale and the venation less strongly developed.

Sclerodermus chilonellae n. sp.

♀ Very similar to *semnoprepiae* but the ocelli rudimentary, the sides of the mesothorax and propodeum the extreme base of first tergite and sides of the abdomen dark, the legs and antennae clear pale yellow. The head varies from reddish to nearly black.

The clypeus is round in front and somewhat expanded. Length about 3 mm.

♂ Similar to that of *semnoprepiae* but the general coloration piceous, legs yellow, antennae yellow infuscate, two yellowish suffused spots on

the base of the scutellum; sutures of the abdomen broadly pale. Length about 3 mm.

Described from five ♀ and 1 ♂ bred by O. H. Swezey from the larva of *Hyposmocoma chiloniella* in the rotten wood of *Pipturus* on the Manoa Cliffs trail, Mt. Tantalus, Oahu, May 13, 1909, and from five ♀ bred with others from rotten wood by D. T. Fullaway on Tantalus probably from the same host and even the same tree.

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society; paratypes in the collection of the Hawaiian Sugar Planters' Association, and in the private collection of D. T. Fullaway and of the author.

Sclerodermus Muiri n. sp.

♀ A black appearing species closely resembling *S. polynesialis*, the propodeum less narrowed basally and the clypeus less produced, slightly emarginate in the middle. The sculpture much like that of *manoa*. Head without any trace of ocelli. Length about 2.5 mm.

Described from one ♀ collected at Kilauea, Hawaii (F. Muir) from the collection of W. M. Giffard. Type in the collection of the Hawaiian Entomological Society.

Sclerodermus tantalus, n. sp.

♀ Head testaceous brown, thorax yellow the mesonotum, mesopleurae and sides of propodeum brownish, abdomen piceous black, the margins of the tergites translucent, legs and antennae yellowish.

Head without any trace of ocelli, the occipital distance more than twice the length of the eye, antennae not at all elongate as compared to *poecilodes*.

Head feebly tessellate, thorax more strongly so, abdomen feebly tessellate more strongly on the declivity of the first tergite. The tessellations of the sides of the pronotum are not so long as those of *polynesialis*, the mesopleura coarsely tessellate but the lines bounding the tessellation are not so much impressed as those on the dorsum; sides of propodeum lineolate-tessellate.

The clypeus is not so strongly produced as in *polynesialis* and the anterior margin is inclined to be reflexed. Length about 2.25 mm.

I was at first inclined to identify this as *euprepes* but that is evidently a larger species with the antennae longer and the occipital distance less.

Described from one ♀ collected on Mt. Tantalus, Oahu (Bridwell). Type in the collection of the Hawaiian Entomological Society.

5. Two Cephalonomia Species in Stored Feeds.

Cephalonomia hyalinipennis Ashmead.

What is believed to be this species was found abundantly in the Grove Farm mill, Haiku, Maui, in August and September 1918 upon rolled barley recently imported from California. All the examples taken proved to be ♀'s.

Cephalonomia gallicola Ashmead.

A yellow wingless ♀ found upon the same barley in much smaller numbers agrees with the description of this species and of *C. Nambeui* Girand. The former was originally bred from galls in Florida and the latter from *Pinus fur* in a mattress in France. Probably they are the same species. This species and the former when placed with small Tenebrionid larvae taken from the feeds and with the caterpillars of *Ephestia elutella* from the same feeds showed no interest. They were decidedly interested in and attacked the larvae of *Bruchus quadrimaculatus* and *Calandra oryzae* but did not oviposit upon them. They were possibly preying upon the larvae of *Sitodrepa panicea*, adults of which emerged in small numbers from the bags of barley.

6. A New Philippine Goniozus.

Goniozus Williamsi n. sp.

Closely related to and resembling *Goniozus triangulifer* Kieffer by the description but the metanotum with parapsidal furrows and the scutellum with small basal pits on either side and the subcosta, parastigma, and stigma yellowish translucent. The lateral areas of the superior face of the propodeum are finely obliquely aciculate.

♂ The anterior femora of the male are pale brownish yellow and the eyes are larger than in the ♀.

Lenth 2.5 mm.

Described from 4 ♀ and 1 ♂ bred by Mr. F. X. Wil-

lians from a group of lepidopterous larva, probably Pyralid, taken from the foliage of a plant, Los Banos, P. I., Jan. 1917. The coccoons which have been preserved in spirits are stramineous and are spun together in a compact mass 2 x 8 mm.

Type ♀ and allotype ♂ in the author's collection; paratypes in the collection of the Hawaiian Sugar Planters' Association.

7. A Subapterous Bethylid from California.

Arysepyris californicus n. sp.

♀ Black; antennae yellow infuscate from the middle of the flagellum on, mandibles piceous at apex, middle and hind trochanters, all the tibiae and tarsi (the middle and hind tibiae suffused with fuscous in the middle) yellow, first tergite with a lateral subapical suffused piceous spot on either side.

Head much broader than the thorax, a little narrowed behind, the occipital distance about equal to the length of the eye; ocelli in an isosceles triangle, the hind ocelli much nearer the ocipital margin than to each other and about five times as far from the eye margin; face carinate between the eyes, the carina not reaching beyond the posterior margin of the lateral (antennal) depressions of the face.

Head and dorsum of thorax strongly and coarsely (microscopically) tessellate, the head evenly punctured with distinct shallow punctures removed from each other about five times their diameter.

Pronotum about as long as the mesonotum and scutellum together, the propodeum a little longer; mesonotum transverse twice as broad as long; scutellum with a narrow transverse sulcus at base, propodeum with the superior face rounded down to the declivity, the microscopic sculpture of the superior face radiating from a longitudinal, smooth area, those on the declivity malleate in appearance. Wings reaching nearly to the middle of the superior face of the propodeum, subovate, rounded at apex, with a costa.

Tergites of abdomen highly polished and shining, with faint transverse lineolations. Length about 4 mm.

Described from one ♀ collected in the sand dune district of San Francisco, Cal., Sept. 8, 1910 (Bridwell). Type in the author's collection.

Arysepyris as a convenience genus established for the reception of subapterous forms which cannot be referred to *Goniozus* and its allies the characters of these genera being mainly venational.

8. Another Philippine Chlorepyris.

Chlorepyris similis n. sp.

♀ Resembling closely and closely allied to *C. flavipennis* Kieffer but differing in the more shining integument of the head and thorax and the finer and sparser puncturation of the head, largely impunctate behind the ocelli, the finer and sparser puncturation of the pronotum, the shorter pronotum and propodeum, and paler, more elongate stigma of the wings, and the paler flavo-piceous tibiae and tarsi. Length 7 mm.; wing 5.5 mm.

♂ The male closely resembles the female. The antennae and legs are more slender and the abdomen smaller, as is characteristic for males.

Length 7 mm.; wing 5 mm.

Described from one ♀ and one ♂ collected at Los Banos, Luzon Philippine Islands (F. X. Williams). Type and allotype in the author's collection.

9. A New Peregrine Sclerogibbine Bethylid Genus from the Hawaiian Islands.

Lithobiocerus n. gen.

Apparently related to *Mystrocnemis* Kieffer but with the mesothorax strongly contracted into two unequal lobes and with the legs differently developed.

Head flattened above, suboval in the dorsal aspect, truncate behind. The eyes coarsely facetted, rounded, hairy, reaching to the occiput and diverging anteriorly; ocelli none; front produced over base of antennae concealing the antennal sockets and clypeus, its anterior margin revealed snoutlike between the bases of the antennae; antennae inserted between the frontal process (anteriorly) and the clypeus (posteriorly); clypeus declivous, tectiform, carinate at its extreme base, swollen in the middle, its base anterior to its apex. Antennae stout, tapering, 25-jointed, the joints broader than long; labial palpi elongate 6-jointed.

Prosternum massive plane, declivous in front; pronotum arcuately emarginate behind, narrowed behind, about twice as long as broad at base, a little longer than the propodeum, twice as long as the mesonotum; mesonotum contracted before the middle. Propodeum broader posteriorly, obliquely truncate without ridges or carinae. Front tibiae and femora strongly incrassate; hind and middle tibiae about the length of their femora, the front tibiae about one-third as long as its femur and somewhat spoon-shaped. Anterior tarsus with large conspicuous pulvillus between the ungues, inconspicuous on the hind and middle legs; ungues with a subapical tooth; calcaria feeble 1-1-2, those of hind legs unequal. Type *Lithobiocerus vagabundus* Bridwell.

Lithobiocerus vagabundus n. sp.

Front of head and antennae reddish testaceous, the flagellum above infuscate toward the apex; rest of head black, thorax and legs yellowish testaceous, abdomen black, the margins of the tergites, apical tergite, and the margins of the sternites broadly reddish testaceous.

Impunctate and without visible sculpture, the entire body including the eyes, antennae and legs covered with fine rather close short pile.

Length 3.5 mm.

Described from one ♀ collected on the veranda of a house beneath which some mixed feed had been stored in Kaimuki, Honolulu, Dec. 23, 1916. Type in the author's collection.

Undoubtedly an immigrant, possibly from the Orient, where some of its allies are found. Whether it is in any way related to the winged male imperfectly described generically by Ashmead as *Probethylus Schwarzi* will require investigation. It is to be hoped that this form, one of but two ♂'s known in the subfamily, will be described by one of the hymenopterists who have access to Ashmead's material.

10. Cleptes from the Pacific Coast.

The genus *Cleptes* has been variously referred to the Chrysididae and the Bethylidae and to a family of its own related to the two. Certainly it seems more similar to Bethylidae than to the Chrysididae, differing from them largely by the greater development of the true metanotum and the reduction of the apical segments. On the other hand they are about as far removed from the true Chrysididae in the development of the metathorax and the abdominal segments as they are from Bethylidae.

The habits of none of our North American species have been observed. The European species so far as known attack the larvae of saw flies after they have coccooned.

Cleptes aliena Patton.

One ♂ collected June 8, 1910, Josephine Co., Oregon (F W. Nunenmacher).

Cleptes Blaisdelli n. sp.

♂ Length about 5.5 mm.; width of thorax about 1.5 mm.; length of wing 4 mm.

Abdominal segments 1-3 ferruginous; flagellum, mouthparts, anterior trochanters, knees, tibiae, and tarsi; middle trochanters femora, tibiae, and tarsae, hind trochanters, tibiae, and tarsi, and 5th abdominal tergite nonmetallic, 5th tergite and tarsi more or less piceous, the rest dull black; calcaria testaceous.

Head, thorax and abdomen in general finely and sparsely punctured.

Propodeum coarsely and deeply reticulate at its anterior middle, the ridges evanescent posteriorly and laterally, its posterior margin nearly straight and its angles produced not quite even with the middle, dentiform but not strongly so, sides of propodeum smooth and shining, 1st tergite smooth and shining; 2nd tergite smooth with fine deep evenly placed punctures, 3rd and following finely rugulose with confluent setigerous punctures. Wings brownish, tegulae metallic with a brown posterior discal spot.

Described from one ♂ collected by Dr. F. E. Blaisdell May 15, 1884, at Poway, Cal. Type in the author's collection.

This fine species does not resemble any of the described American species, the red abdomen abundantly distinguishing it.

Cleptes purpuratus Cresson.

The account of this species in Aaron's Chrysididae is misleading. The abdomen of the female is not at all similar in color to the thorax and in the ♂ the reflections are feeble.

♀ Head, thorax and legs to the femora metallic green with various cupreous and golden reflections, the propodeum blue green, antennae legs beneath the metallic reflections and the abdomen piceous brown, the tibiae and tarsi more testaceous.

Head and pronotum rather coarsely and sparsely punctured, the surface between somewhat uneven, but highly polished and shining; the surface of mesonotum smooth highly polished and shining with finer sparser punctures, scutellum much the same, the punctures obsolescent, metanotum with the lateral depressed areas or pits dull, blue, propodeum with the superior face irregularly reticulate throughout with two fine converging carinae about one third the distance from the sides to the middle, its posterior carina well defined nearly straight, the lateral angles dentiform; mesopleura polished, rather sparsely coarsely punctured, metapleura and sides of propodeum striate.

Abdomen flattened above, highly polished, particularly the impunctate 1st tergite, 2-4 finely, evenly, and closely punctured excepting on the posterior margins. The apical segment of the abdomen is indicated by a tube extending from the 4th segment.

There are some obscure metallic reflections on tergite 4.

Wings brownish hyaline.

♂ Resembles the ♀ but the head smaller, the antennae longer; the propodeum is more golden in coloration, reticulation of the propodeum is more regular in the middle and less complete laterally; the surface is less even and the posterior marginal carina less complete, the lateral angles less acute. The abdomen has greenish reflections on all the tergites at least laterally, the surface is less highly polished and more convex, the punctures are less definite on segments and there is more pilosity on the surface.

Five tergites can be seen, the fifth very small.

The legs have the tibiae dark with greenish reflections and the reflections on the femora are very much stronger.

One ♀ Corvallis, Oregon, Sept. 15, 1907. One ♂ Pamelia Lake, Mt. Jefferson, Oregon, July 17, 1907 (J. C. Bridwell).

NOTES AND EXHIBITIONS.

Maui insects.—Mr. Giffard exhibited a collection of insects representing six days collecting by himself and Mr. Fullaway on the island Maui.

Ascyltus penicillatus.—Mr. Pemberton exhibited a male of this large spider a pair of which he had found on vanilla in Kona, Hawaii. The female had been sent to Washington for determination.

Kelisia.—Mr. Fullaway exhibited eggs of this leafhopper in bunch grass, parasitized by a species of *Anagrus.*

Pseudococcus straussiae.—Mr. Ehrhorn stated that he had collected this mealybug at Kilauea, Hawaii, and that it was parasitized by the same species of *Anagyrus* as is obtained from it on Oahu.

Trionymus insularis.—This mealybug was reported by Mr. Ehrhorn as taken on *Deschampsia* at 29 miles, Kilauea, Hawaii.

Pipunculus sp.—Mr. Timberlake exhibited specimens of a species of Pipunculus fly, four of which were obtained by Mr. Williams in field 40, Oahu Sugar Co.'s plantation. A fifth specimen was bred by Mr. Rosa from material collected in cane

at the Experiment Station. All come near to *P. terryi* described from Kauai. Two specimens of the latter species were exhibited, collected recently by Mr. Timberlake at Grove Farm, Kauai.

Proterhinus maurus.—Mr. Swezey exhibited a specimen of this, the largest species of this genus of beetles. He also exhibited twigs of the large-leaved *Suttonia* (considered a distinct but undescribed species by Mr. Rock), collected by Mr. Bridwell May 23rd, on Mt. Olympus, showing the work of the larvae of this beetle. The adult beetle exhibited had bred out after the twigs were brought down. Mr. Swezey called to attention that in the Fauna Hawaiiensis Dr. Perkins recorded this *Proterhinus* from *Pelea*, which is an error, as the original specimens were collected from this same large-leaved species of *Suttonia*.

Egosoma reflexum.—Mr. Swezey exhibited a larva and a pupa of this Prionid beetle taken from a dead and rotten ohia tree beside the Mt. Olympus Trail, May 23rd, 1918. There were a good many larvae of various sizes in the tree. This indicates that the species is common on this island, whereas a few years ago it was considered rare.

Nesosydne koae.—Mr. Bridwell reported the finding of this leafhopper on koa in the new planting of *Acacia koa* on Sugar Loaf, May 26th.

Cerambycid in pods of Acacia farnesiana.—Mr. Bridwell reported that on May 30th, 1918, while examining pods of *Acacia farnesiana*, recently-dead pods were found rather frequently infested by a Cerambycid. The same species was found previously in old lima bean pods, and is the one previously reported bred from dead petioles of papaya (*Carica papaia*).* The larvae are pugnacious and attack others when placed in the same box, and in no case was more than one larva found in a pod. The pods attacked were apparently those previously moth-eaten by the Tortricid *Cryptophlebia illepida*.

* Proc. Haw. Ent. Soc., III, p. 388, 1918.

JULY 11TH, 1918.

The one hundred fifty-fourth meeting of the Society was held in the usual place, President Pemberton in the chair. Other members present: Messrs. Bridwell, Ehrhorn, Fullaway, Kuhns, Rosa, Swezey, Timberlake and Willard.

Minutes of previous meeting read and approved.

The Secretary read a letter from the Trustees of the Hawaiian Sugar Planters' Association stating that $350. yearly had been appropriated by the Association toward the expenses of publication of the Proceedings.

A vote of thanks was extended to the Association.

A communication was read from the Washington Entomological Society enclosing a set of rules adopted by that Society for the guidance of the Editor in the publication of new species in the Society's publications, and asking our Society to adopt them. The matter was referred to a Committee composed of Messrs. Swezey, Bridwell and Timberlake.

PAPER.

Notes on Nesomimesa antennata (Smith) (Hymenoptera).

BY JOHN COLBURN BRIDWELL.

Mr. Williams' observations* on the habits of the Hawaiian species of this genus has confirmed the opinion some of us have held that the observations of Dr. Perkins in regard to this genus attacking craneflies were in some way exceptional or peculiar and that the real habits would be found different. Mr. Swezey had previously found the Oahu species carrying leafhoppers of the Cixiid genus *Oliarus*. On June 9, while collecting upon the Lanihuli ridge bounding Nuuanu Valley to the north-west, *Nesomimesa antennata* (Smith) was found in very large numbers flying about in the drizzly rain over the

* See pages 63-68 following. [Ed.]

staghorn ferns (*Gleichenia dichotoma*). A great majority were males but an occasional female was found and when one of them settled on a leaf the males would swarm about her but actual mating was not observed tho I do not doubt that had I taken time to watch it might have been observed. One female was seen carrying something beneath her thorax apparently between the legs of the middle and hind pairs. Upon capturing her this was found to be an adult *Oliarus*, probably *kaonohi* Kirkaldy, which is commonly found on this fern. From my previous observations of the places in which this species is found in numbers I have no doubt that the normal prey of this species is made up of the native leafhoppers as would be expected on account of the habits of Mimesids elsewhere.

Bruchidae of the Helms Collection (Coleoptera).

BY J. C. BRIDWELL.

The Bruchidae of the Helms collection of Australian insects at the Bishop Museum have been cleaned and remounted. Only three species are represented.

Bruchus semicalvus Lea. Proc. Linn. Soc. N.S.W., 33:638, 1898. Sydney, Sept. 2, Oct. (Helms).

Bruchus diversipes Lea. Proc. Linn. Soc. N. S. W., 33: 640, 1898. Sydney (Carter).

Bruchus obtectus Say.
North Sydney.

NOTES AND EXHIBITIONS.

Pectinophora gossypiella.—Mr. Bridwell exhibited a specimen of the pink boll-worm bred from the native cotton, *Gossypium tomentosum*. Out of 66 bolls, two showed infestation, and only one larva matured.

Minthea rugicollis.—This rare beetle reported caught at light indoors by Mr. Bridwell.

Opius lantanae.—From a lot of lantana seeds collected in the Punchbowl district of Honolulu, Mr. Bridwell reported that more of this Braconid issued than of its host the Agromyzid seed-fly.

Microbracon pembertoni.—This parasite of the pink bollworm, Mr. Bridwell reported as having been bred from *Cryptophlebia illepida.*

Derebroscus politus.—Mr. Bridwell reported having again taken this Carabid beetle on Lanihuli Ridge.

Hydrophilfid.—Mr. Bridwell exhibited specimens of a small beetle possibly a Hydrophilfid found associated with ants at Waianae at sea level.

Pteromalid.—Mr. Bridwell reported having found another Pteromalid which will attack Bruchids.

Neelysia mactella.—This moth reported by Mr. Bridwell as bred from webs in moss.

Euarmonia walsinghami.—This Tortricid moth reported by Mr. Bridwell as bred from koa pods.

Cryptophlebia parasites.—Mr. Bridwell reported having bred *Pimpla hawaiiensis, Cremastus hymeniae* and *Omphale metallicus* from *Cryptophlebia* in koa pods, probably both *illepida* and *vulpes.*

Cecidomyid.—Mr. Bridwell reported breeding a Cecidomyid from the remains of the seeds of a Livistonia palm which had been destroyed by a Scolytid beetle.

Chaleolepidius erythroloma.—Mr. Swezey exhibited a specimen of this large Elaterid beetle reared from a nearly full-fed larva found in a standing dead trunk of *Maba sandwicensis* at Niu, February 10th, 1918. As there were termites and moth larvae (*Semnoprepia* sp.) present, it was taken to be predacious. It had been fed on *Adoretus* grubs, flies and ground roaches, and molted on the following dates: Feb. 20, March 17, April 22. It pupated June 11, and became adult June 26. It was about a week becoming hardened up.

Dolichurus stantoni.—This wasp which is parasitic on roaches (*Phyllodromia* spp.) was introduced from the Philippines in 1917, a few being liberated in Makiki Valley in June and October of that year. Mr. Swezey reported recently finding them in the cane fields at the Experiment Station, H. S. P. A., thus indicating that it has become established.

Epeleytes draptes.—Mr. Swezey exhibited a specimen of this bug taken by him at light in Kaimuki, June 30th. The type specimen was collected by him in an old dead bean pod (*Canavalia* sp.) of a vine growing on a stone wall at Koloa, Kauai, August 2nd, 1908. It was described by Kirkaldy in Proc. Haw. Ent. Soc., II, p. 119, 1910. Since the first capture there has been no other record of its capture till now. Mr. Timberlake reported capturing 4 specimens at light in Kaimuki, June 29th to July 8th.

Geuophantis leahi.—Mr. Swezey reported having reared this Phycitid moth from *Euphorbia* n. sp. collected by Mr. Rock on Molokai, May 30, 1918. It is the first record of this moth from Molokai.

Lycaena hoetica.—This butterfly was reared by Mr. Swezey from *Sesbania tomentosa* collected by Mr. Rock on Molokai, May 30, 1918.

Xiphidium varipenne.—Mr. Swezey exhibited some pods of *Acacia farnesiana* which had had the outer surface eaten off. He had observed some of the *Xiphidium* grasshoppers in the act of doing this. It was in the region lying on the slope beyond Kaimuki toward Waialae.

Java insects.—Mr. Ehrhorn exhibited a small collection of insects from Java.

Elachertus sp.—Mr. Timberlake exhibited this small Chalcid reared from *Hypothenemus* by Mr. Crawford.

Rhopalotus sp.—Mr. Timberlake exhibited a prettily marked yellowish and green species of an Entedonine, taken in grass at Lihue, Kauai, recently, which runs to this genus.

Tortricid in apricot.—Mr. Rosa exhibited a Tortricid moth recently reared from an apricot fruit from California.

AUGUST 1st, 1918.

The one hundred fifty-fifth meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present, Messrs. Bridwell, Ehrhorn, Fullaway, Mant, Osborn, Potter, Rosa, Swezey, Wilder, Willard and Williams.

Minutes of previous meeting read and approved, with corrections.

The Committee appointed at the last meeting to consider the rules adopted by the Washington Entomological Society to apply to the publication of entomological descriptions and papers, submitted its report, which is embraced in the following rules and suggestions:

Rules and Suggestions Applying to Types and Entomological Descriptions and Papers in the Publications of the Hawaiian Entomological Society.

Rule 1. No description of a new genus, or subgenus, will be published unless there is cited as a genotype a species which is established in accordance with current practice of zoological nomenclature.

Rule 2. In all cases a new genus, or subgenus, must be characterized and if it is based on an undescribed species the two must be characterized separately.

Rule 3. No description of a species, subspecies, variety or form will be published unless it is accompanied by a statement which includes the following information, where known (1) the type locality, (2) of what the type material consists —with statement of sex, full data on localities, dates, collectors, number of specimens, etc., and (3) present location of type material.

RULE 4. In the discussion of type material of insect species, the following terms shall be used in the sense as defined below:

Type series. All the specimens studied by the author at or before the time of the completion of the description and specifically mentioned in the description.

Type=holotype. One individual selected by the author to represent the species.

Allotype. One individual of the opposite sex from the type selected by the author from the type series to represent that sex.

Paratypes. The other specimens of the type series besides the type.

Cotypes. Members of the type series when no individual has been selected by the author as a type.

Lectotype. An individual selected from a cotype series subsequently to the publication of a description to take the place of a type.

Neotype, metatype, topotype. This Society disapproves of the use of these terms, or any other word containing the radical "type," except as applied to material before the author at the time of the completion of the description. If an author desires to employ any other terms with reference to type material, these should be defined in the paper in which they are used.

RULE 5. No unsigned articles, or articles signed by pseudonyms or initials, will be published.

RULE 6. The ordinal position of the group treated in any paper must be clearly given in the title or in parentheses following the title.

SUGGESTION 1. All illustrations accompanying an article should be cited in the text and preferably in places where the object illustrated is discussed. All plates should be provided

with designation of figures, if any, explanations, and citation of text pages.

SUGGESTION 2. It is desirable in describing new genera and species that their taxonomic relationship be discussed, and that distinguishing characters be pointed out.

SUGGESTION 3. In all cases in the serial treatment of genera or species and where first used in general articles the authority for the species or genus should be given, and the name of the authority should not be abbreviated.

SUGGESTION 4. Where the title of any publication referred to is not written in full, standard abbreviations should be used.

SUGGESTION 5. When a species discussed has been determined by someone other than the author it is important that reference be made to the worker making the identification.

NOTES AND EXHIBITIONS.

Thecla echion.—Mr. Williams recorded the rearing of this butterfly from larvae feeding on pods and seeds of *Cordia sebestena*. The larvae pupated June 21, and the adults appeared July 5.

Nesophryne sp.—Mr. Swezey exhibited specimens of this large Jassid captured on the ridge known as Malamalama on the windward side of Mt. Konahuanui. He and Messrs. Bridwell and Timberlake collected 13 adults off *Clermontia kakeana* and 1 off *Byronia*. The known species of this genus occur only on Kauai. These are the first found on Oahu, and probably constitute two new species.

Bombycid cocoons.—Mr. Ehrhorn exhibited some very remarkable cocoons, probably of species of *Cecropia*—one from Bolivia and one from Japan.

Termites from yams.—Mr. Ehrhorn exhibited specimens of termites taken in a shipment of yams in his quarantine inspection work.

Insects from Jahore.—Mr. Mant exhibited a small collection of attractive insects from Jahore, Malay Straits—moths found in a garden, beetles from the forest, and a blue chrysidid found in a railway tie.

Insects from Barbados.—Mr. Wilder exhibited the following insects recently received from Barbados: *Diaprepes abbreviatus*, *Phytalus smithi*, both of which are the adults of sugar cane root grubs; *Tiphia paralella*, a parasite on the grubs of *P. smithi*.

Nesodryas perkinsi.—Mr. Timberlake exhibited a male of this Delphacid taken on *Clermontia kakeana* at Malamalama, July 28.

Nesodryas bobeae.—Mr. Timberlake exhibited a female of this Delphacid collected on Palolo Ridge, April 8th, 1917. This species has not been collected since 1905.

Diachasma tryoni.—This Braconid parasite of the Mediterranean fruitfly was reported common by Messrs. Wilder, Swezey and Fullaway, all having found it working on infested fruit in Honolulu gardens.

SEPTEMBER 5TH, 1918.

The one hundred fifty-seventh meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Ehrhorn, Fullaway, Giffard, Potter, Swezey and Williams. Mr. Fordyce Grinnell, Jr., was a visitor.

Minutes of previous meeting read and approved.

The Secretary was instructed to prepare copies of the rules for the preparation of descriptive papers adopted at the last meeting and distribute the same to the active members.

On the Genus Ilburnia White (Homoptera, Delphacidae).

BY F. MUIR.

(PRESENTED BY W. M. GIFFARD.)

Ilburnia White 1878, Proc. Zool. Soc., Lond. p. 471, subgenus of *Liburnia* Stal.

Nesosydne Kirkaldy 1907. Proc. Haw. Ent. Soc. I. p. 161.

In the British Museum collection there are two female specimens under the name of *Ilburnia ignobilis* White, collected by Wollaston on Diana's Peak, St. Helena. The type is in good condition but the second specimen, which is smaller and darker and represents another species, is without tegmina. The shape of the tibial spur places them among the Alohini and there is no structural difference to separate them from *Nesosydne* Kirkaldy. *Delphax simulans* Walker, collected by Darwin in the Galopagos Islands, also has to come into the same genus although it is not quite typical. This makes the present known geographical distribution for this genus, Hawaiian Islands, with many species, Galopagos Islands, with one species, and St. Helena, with two species. *I. ignobilis* White and *I. simulans* (Walker) are redescribed below.

Unfortunately the name *Nesosydne*, so well known to our local collectors, will have to give place to *Ilburnia*.

Ilburnia ignobilis White.

Head much narrower than thorax; vertex slightly longer than width of the base, apex narrower than base; length of face a little more than twice the width, slightly narrowed between the eyes, median carina simple; clypeus tricarinate; antennae long, reaching to apex of clypeus, terete, joints subequal in length, second slightly thicker than the first. Pronotum and mesonotum tricarinate, lateral carinae of pronotum diverging, straight, reaching hind margin. Tegmina not reaching to the middle of abdomen, truncate at apex. Legs long, slender, first hind tarsus longer than second and third together, spur nearly as long as first tarsus, nar-

row, cultrate, thick, convex on both surfaces, or very slightly flattened on inner surface, nine large teeth on hind margin.

Yellow or light brown, darker between carinae of head and thorax, nearly black between carinae of face, two broken, darker medio-lateral stripes down abdomen. Tegmina hyaline, yellowish, veins, concolorous with membrane, granules small, sparse, with yellow hairs.

Length 4.6 mm.; tegmen 1.7 mm.

One female from Diana's Peak, St. Helena (*Wollaston*).

The second specimen under this name from the same locality represents another species but is not in good enough condition to describe.

Ilburnia simulans (Walker).

Delphax simulans Walker, List of Hom. Insects II. p. 355 (1851).

Male. Head slightly narrower than thorax; vertex slightly longer than width at base, perceptibly narrowed to apex, carinae normal; length of face nearly double the width, narrowest between eyes, broadest slightly distad of middle, median carina simple; antennae reaching to apex of face, terete, first joint about half the length of the second; pronotum tricarinate, lateral carinae straight, diverging posteriorly, reaching hind margin, mesonotum tricarinate. Legs comparatively short, first hind tarsus sub-equal to the second and third together, spur small, about two-thirds the length of first tarsus, cultrate, thick, both surfaces convex or with the inner surface very slightly flattened, ten small teeth along the hind margin.

The form of the tibial spur places this species in *Ilburnia* of the Almini, otherwise it would be best placed in *Kelisia*.

Head, thorax and legs light brown, carinae and antennae lighter, abdomen dark brown. Tegmina reaching half way down the abdomen, hyaline, light brown, a dark brown mark at the apex of clavus, slightly brownish over basal area of tegmen.

Length 2.2 mm.; tegmen 1.3 mm.

Two specimens from James Island, Galopagos Islands (*C. Darwin*).

Female similar to the male but the abdomen slightly lighter.

Length 2.6 mm.; tegmen 1.3 mm.

Three specimens, one from Charles Island and two from James Island. (*C. Darwin.*)

There is one specimen from James Island without an abdomen which I believe to be a male. Two nymphs from James Island, dark brown, marked with light down the middle of abdomen and on head and thorax, with two median facial carinae and the antennae are short, the first joint about as long as wide.

Notes on Collection of Hawaiian Insects on Island of Maui.

BY D. T. FULLAWAY AND W. M. GIFFARD.

Notwithstanding the very rainy weather which prevailed on the Island of Maui during last June, several short collecting trips were made on the slopes of Haleakala, the Wailuku Commons and in the western part of the Island. Altogether attempts were made to collect on five separate days, but the continuous rain, drizzle and fog on the mountain and in the valleys were such that the vegetation and collecting outfits were thoroughly saturated most of the time. Because of this, much inconvenience in collecting and losses in insects were sustained and results were less satisfactory than they might have otherwise been. During the entire period a total of twelve hours actual collecting was all that could be obtained.

The most favorable locality on this visit was Olinda, along the pipe line, at an elevation of 4200 feet. There is a fair automobile road up to within a mile of the lower end of the trail, the latter extending for some distance into an interesting forest region. The further along this trail the weather and other conditions allow one to tramp and collect the more interesting it becomes. Unfortunately the weather did not permit us to penetrate very far from our headquarters although two attempts were made. Even under the existing conditions there were collected several very interesting species of Carabids including *Barynens sharpi, Atelothrus, Metromenus, Metrothorax* (two species) and others undeterminable, *Plagithmysus pennatus*, and *finschi, Clytarlus vestitus, Proterhinus lecontei,*

Proc. Haw. Ent. Soc., IV, No. 1, June, 1919.

brevipennis and several other species, *Acalles humeralis*, *Paranthita aeneus*, and several species of *Oodemas*, among the Coleoptera; *Anomalochrysa sororˌ* an Aphis lion; *Odynerus camelinus*, *nivicola*, *erythrostactes*, *Nesoprosopis difficilis*, *Deinominesa halealealae*, among Aculeates, and one *Eupelmus*, one *Pleuroneurophion*, *Enicospilus molokaiensis* and *Scleroderma polynesiale*, among the Parasitica; and of Homoptera several species of Jassids and several of *Oliarus* and 4 new species of Delphacids which will be described later on. Unfortunately among the latter the males were sparse in individuals only two or more of the species having been taken in series of both sexes with nymphs. So far as it was possible all food plants of the species were recorded for convenience of others who may desire to explore this interesting region.

A day or two later a short visit was made to the new Hamakua ditch trail (Lupe) but the road to this region was almost impassable and much time was lost in getting there. The forest here is at an elevation of approximately 1200 feet and is not nearly so interesting as that near Olinda. The indigenous vegetation is much more sparsely distributed because of destruction caused by stock; and foreign weeds and grasses have crept in and are destroying much of the indigenous growth. It rained almost constantly on the day of our visit and in consequence there was not much to record from this region other than one new species of *Nesosydne* and several Jassids amongst the Homoptera and *Odynerus ecostatus*, *camelinus* and *instabilis* among the Aculeates.

A morning was spent on the Wailuku Cornmens but the indigenous vegetation on these sand hills has become very sparse due to continual pasturing of cattle and use of large portions of the locality in recent years for the growth of sugar cane and other purposes. On *Coreopsis mauiensis* a large series of what is apparently a new *Nesosydne* was taken but Aculeate Hymenoptera, particularly the low land species of *Odynerus* and *Nesoprosopis* which were formerly quite abundant in the

region, were almost absent at this time. One *Proterhinus* and four *Oronomiris hawaiiensis* were also taken.

A short visit in the direction of Lahaina was made in fine weather but here again many of the interesting lowland and coast forms of Aculeates were comparatively scarce except in the commonest of species—*Odynerus purpurifer, insulicola, smithii, rubrotinctus, Nesoprosopis facilis, Crabro mandibularis*, and one Carabid were taken. On *Ipomoea pes-caprae, I. insularis* and *I. platyphylla* a series of Delphacids (*Aloha* sp.) were taken but all these are apparently the common *A. ipomoeicola*. The extreme variations in color of this Delphacid as captured on these three species of *Ipomoea* is very marked and notwithstanding that all were taken at practically the same elevations and within a few hundred feet of each other. There is room for study as to why these extreme variations in the color exist in some of our commonest Delphacids, and the theory already advanced in Mr. Muir's notes on Hawaiian Delphacids that this variation is caused in part by the food plant appears plausible to some extent.

On the day of our return to Honolulu a short visit was made to Iao Valley, weather conditions being such as to prevent a previous tramp in that region. The trails into the valley at the time were practically impassable because of heavy rains, so that we were only able to get as far as the first crossing of the Wailuku river. At this point on a small area of *Eragrostis variabilis* a long series of both sexes and young of a new species of *Kelisia* was obtained. This is the first species of that genus of Delphacids taken on Maui so far as is known. One *Proterhinus*, several Jassids and *Odynerus ecostatus* and *purpurifer* were also taken.

Description of Paranagrus osborni n. sp. (Hymenoptera, Mymaridae).

BY D. T. FULLAWAY.

Paranagrus osborni n. sp.

♀ .6 mm. long, flavous, head smoky with some black markings, abdominal tergites, all the joints of the flagellum and the valves of the ovipositor fuscous. Very similar to *P. optabilis* but smaller in all proportions. Length of wings .48, length of valves of ovipositor .25, length of valves to the suture .18. There is a constant difference in the proportionate length of the two sections of the valves on either side of the suture. In *P. osborni* it is 1:3.4; in *P. optabilis* 1:3.

♂ pallid, markings fainter; distal antennal joints broken off.

Type locality—Los Banos, Philippine Islands. Bred from eggs of *Peregrinus maidis*, by H. T. Osborn, 1915. Type and 16 paratypes including 1 ♂ on three slides. Types in the collection of the H. S. P. A. Experiment Station, Honolulu.

NOTES AND EXHIBITIONS.

Maui insects.— Mr. Giffard exhibited four boxes of insects collected on Maui in June, and gave notes on the Delphacids in the collection, some of which were new species. He also exhibited specimens of a new species of *Kelisia* and a new species of *Hburnia* and a number of Jassids collected on Molokai in June by Mr. J. F. Rock.*

Holochlora venosa.—Mr. Swezey exhibited a specimen of this large green Locustid or katydid, collected by Mr. Charles Atherton at Luakaha in Nuuanu Valley, where he said that they had recently appeared quite common. Mr. Timberlake reported that he had bred *Amblatus kochelei* from eggs of this katydid brought in by Mr. Rosa. The parasites had emerged six weeks after the eggs were brought in.

Oxya velox.—Mr. Swezey reported the finding of a small

* The new species of Delphacids in the collections exhibited have been worked by Mr. F. Muir. See his paper farther on in this issue

colony of this grasshopper at Haiku, Maui, August 24th. It has been known on Oahu and Kauai since 1897, but has not previously been reported from Maui.

Scolia manilae.—Mr. Swezey reported observing a male specimen of this introduced Philippine wasp in his garden at Kaimuki, Sept. 2nd. A colony of female wasps had been liberated there several months previously, and this is the first evidence of their having become established there and breeding on the grubs of *Adoretus*. Mr. Timberlake reported having recently observed one of the wasps on the window at the Experiment Station.

Euphorbia insects on Maui.—Mr. Swezey exhibited the following insects collected by him on *Euphorbia* in Iao Valley, Maui, August 8th, 1918, in each case being the first record of these insects from Maui:

* *Dictyophorodelphax* n. sp. Different from the two species occurring on Oahu.

Jassid. Apparently closely related to an undescribed species that has been collected abundantly on *Euphorbia* on the coral plain below Ewa Mill, Oahu.

Ithamar n. sp. Apparently the same undescribed species of bug that was collected on *Euphorbia* on Niu Ridge, and at the Pali, Oahu.

Cimex lectularis.—Mr. Fullaway exhibited specimens of the bed-bug with eggs and nymphs. Six eggs were laid by one female and they hatched in seven days. The young frequently sought protection beneath the body of the mother. All were active after a week in confinement without food.

Pentarthron flavum.—Mr. Fullaway reported breeding this Trichogrammatid from the eggs of *Lycaena boetica* and *Pectinophora gossypiella.*

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* Described on page 72 following. [Ed.]

OCTOBER 3RD, 1918.

The one hundred fifty-seventh meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Giffard, Langford, Rosa, Swezey and Williams.

Minutes of previous meeting read and approved with corrections.

Mr. Fordyce Grinnell, Jr., was elected to active membership.

PAPERS.

Epyris Extraneus Bridwell (Bethylidae), a Fossorial Wasp That Preys on the Larva of the Tenebrionid Beetle, Gonocephalum Seriatum (Boisduval)

BY FRANCIS X. WILLIAMS.

Epyris extraneus was first taken in the Hawaiian Islands by Swezey in October and November, 1915, on the grounds of the Experiment Station of the Hawaiian Sugar Planters' Association at Honolulu, Oahu. Subsequently he found it in 1917 on the island of Maui. It is now quite abundant on Oahu where it seems more partial to the lowlands and can be taken at all seasons of the year. Bridwell, who described this *Epyris*, (Notes on a Peregrine Bethylid, Proc. Haw. Ent. Soc. for 1916, Vol. III, No. 4, pp. 276-279, 1917), also identified specimens from Los Baños, Philippines, as belonging to this species and so it seems probable that it has a fairly wide Oriental distribution.

Very little is known about the life-history of the genus *Epyris*. Bridwell (A note on an *Epyris* and its Prey, Proc. Haw. Ent. Soc. for 1916, Vol. III, No. 4, pp. 262-263, 1917) found an *Epyris* sp. near Capetown, South Africa, dragging a small tenebrionid larva between its jaws, and in the same

article speaks of H. T. Osborn, of this Station, as having found, in September, 1915, near Pearl City, Oahu, a tenebrionid larva externally parasitized by a grub, and he concludes that the latter must have been *Epyris*. During August and September, 1918, I succeeded in rearing, from egg to adult, six males and one female of *Epyris extraneus* Bridwell from the larva of *Gonocephalum seriatum*. The adult *Gonocephalum* (Fig. 1) is a stout oval, dull black beetle 8 or 9 millimeters long, very abundant at low levels, where it occurs under clods of dirt, cane trash and other rubbish. Its larva (Fig. 2) is quite slender, firm and cylindrical, of yellowish and brown or straw color and at maturity is about 17 millimeters long. It is a vigorous insect bearing a superficial resemblance to a wire-worm (Elateridae), but does not appear to be injurious, and in cane fields is probably a trash feeder. On being dug out of the ground it usually "plays possum" for a brief instant and then hastens to get under cover, burying itself with commendable speed.

The black *Epyris* wasp (Fig. 3, female) is far smaller than the larva it attacks; the female is about 6 mm. long and the male often a little smaller. The female especially, is a strongly made, lithe insect with stout jaws and legs, a good flyer and a better digger, surpassing in the latter respect the *Scolia* wasps which in habits it somewhat resembles. One *Epyris* which I enclosed from August 5th to 18th with a number of *Gonocephalum* larvae in a tumbler partly filled with earth, stung and parasitized 13 larvae. Two other wasps kept for a short time laid 2 and 3 eggs respectively. The wasps mandibles are of a rather unusual type; but well fitted for gripping, being stout and somewhat recurved at the tip. It is to be noted, however, that (under my limited observations) she selects larvae within a certain limit of size, i. e. from about 13.5 to nearly 16 mm. long; these do not appear to be in the last instar, when they are probably too powerful for her to overcome. The prey though rendered helpless is not stung to complete immobility; it is still capable of weak mouth and

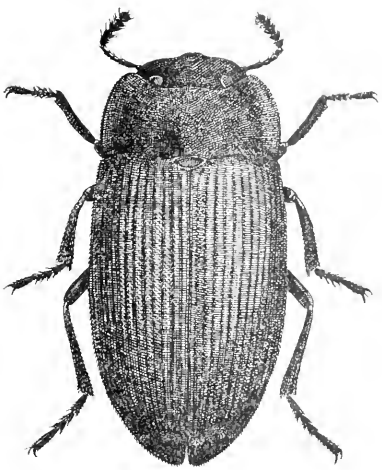


Fig. 1.
Gonocephalum seriatum.

Fig. 2.
Larva of G. seriatum with egg of Epyris extraneus on ventral surface.

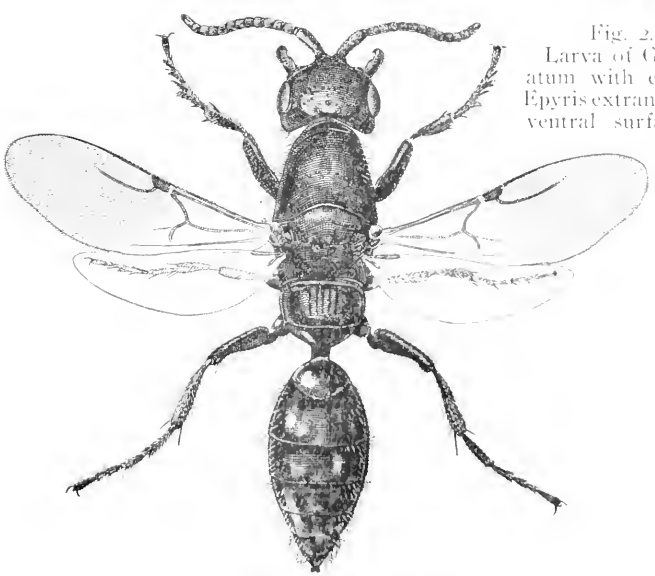


Fig. 3. Epyris extraneus.

leg movements and may also move and twitch the body a little, when seized with the forceps, however, this unusual stimulus causes it to wriggle vigorously.

On the morning of October 5, 1918, I was able to observe the field habits of this wasp on the Station grounds. The day was warm and sunny and in addition to *Epyris*, the introduced *Scolia manilae* Ashmead and *Dolichurus stantoni* (Ashmead) were also flying along the edges of an area planted to sugar cane. Male *Epyris* were the more abundant and evidently on the lookout for emerging females, but once in a while one of the latter could be seen flying low from place to place and hurriedly running beneath and among the superficial clods of earth in search of her prey. Finally I came upon one of these wasps circling about a spot and at last locating her paralyzed victim, a *Gonocephalum* larva which she had evidently wedged in between two small lumps of dirt. She seized it by the head end and, slinging it over her back, so to speak, dragged it into a hole nearby, wasp and grub entering at the same time. Later I could find nothing of wasp and prey on digging in the spot. I soon located another hunting *Epyris* and being provided with a *Gonocephalum* larva I carefully placed one of these alongside a small clod of earth under which *Epyris* was for the moment hunting; she issued therefrom very shortly almost exactly at the spot where lay her natural prey, still "playing possum". The wasp came immediately to attention, crawled carefully on the back of the larva and seizing it by the head with her mandibles curled her body around the thorax of the now vigorously squirming victim and soon immobilized it with her sting. No preliminaries followed as in many other wasps, the grub was seized without further ado apparently by a palpus and borne along rapidly on the wasp's back. The little insect was not quite half as long as her heavy booty which being carried with the back up nearly hid the wasp from view and made it appear as if the *Gonocephalum* was making headway under its own steam. After traveling thus rather aimlessly for eight or ten feet, the

Epyris, which was now quite tame, wedged her prey between loose pieces of soil, but not hiding it from view, left it to look for a nesting place; she examined several holes or ledges and finally selected a spot under a small piece of soil. During this hunt she returned once to her prey; now she seized it as before and carried it in a rather circuitous fashion towards the selected spot, but here, on account of the steep and crumbling nature of the ground, could make no headway, and so with my assistance she disappeared with her burden beneath a piece of soil. On digging in this place some minutes later I found the *Gonocephalum* an inch or more in the ground and the *Epyris* a little further in the soil. The egg had not yet been laid.

On November 15 on a sugar plantation near Honolulu I unearthed a *Gonocephalum* larva which had a small *Epyris* grub feeding upon it.

The wasp seems to form a sort of cell about its paralyzed prey and completes her work with laying a pearly white egg upon her victim. The egg (Fig. 2) is about .70 mm. long and is glued for its length along the middle of the 4th segment; it is slightly curved along the line of appression, hardly three times as long as thick, and slightly broader and blunter at the head end, which, however, points towards the posterior extremity of the body of its host. The latter lies on its back in a more or less arched position. The egg hatches in about 2 1 2 days, the larva crawling out to segment 5, commences to feed on that segment; it is successful in penetrating or drawing nourishment through the tough integument of the beetle grub, so that it soon acquires a yellowish white color. In one case I found on *Epyris* egg fixed along the side of the body at about its middle length. The grub hatched and although its host was dead, managed to feed to maturity on it. It does not seem probable that the mother *Epyris* pierces the integument of her prey at the point where she lays the egg, so as to facilitate the feeding of the issuing grub; she selects the 4th ventral segment as a place for oviposition because it protects the egg

better there than elsewhere. Presently the position of the larva is reversed, for though always feeding at segment 5 it now lies head to head with its host. It was after this change of position (Fig. 4) that I found a shrivelled exuvial cap or moult skin glued just dorsad to the end of the body. A little later on there is a second moult. At the end of three days, it is about 4 mm. long, proportionately stout and more maggot-like than in most Fossoria; clearly segmented and of a dirty yellowish white color. It is closely fixed for its ventral length to the yet living *Gonocephalum* larva by a sticky substance. The third moult takes place in probably less than a day before the larva becomes full fed. It is now armed with a much larger and stouter pair of mandibles with which it bites a good-sized hole through the fifth ventral plate of host, inserts its head and fore part of the body through this aperture, and protruding therefrom at right angles (Fig. 6) eats out the interior, first taking one end and then the other. The beetle grub succumbs at the beginning of this crude operation and when entirely eaten out is reduced to a shrivelled, transparent brownish shell. As in other fossorial wasp larvae, it is most active in the last instar; it may squirm vigorously and with the aid of a clear yellow fluid rid itself of the three shrunken moult skins, each one telescoped inside the other to form a shallow concave wrinkled disk of yellowish color. The larva becomes full fed at the end of four or five days when it is about 7 mm. long by 2.5 mm. thick below the middle, fat and glistening, with little in the way of scallops or folds; it has a relatively small head armed with stout, dark-tipped mandibles and behind the latter, long protruding mouth-parts. Its posterior extremity heretofore rather bluntly rounded is now produced into a sort of nipple. It is mainly a pretty salmon pink color, peppered with white fat-bodies, which however are lacking along the ventral line, while the extremities and lateral folds are more glassy and clearer. It is well to draw attention to the four pairs of larval mandibles, representing the four instars (Fig. 5, a—d); they are drawn to the same scale, the

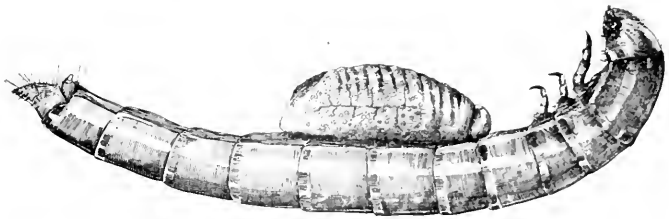


Fig. 4. Epyris extraneus larva feeding on larva of G. seriatum.

Fig. 6. Later stage of the same.

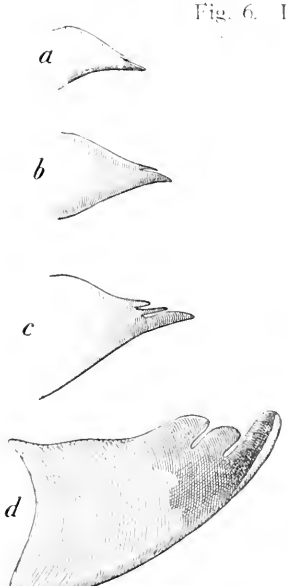


Fig. 5.
Mandibles of the successive stages of larvae of Epyris extraneus.

Fig. 8.
Pupa of E. extraneus.

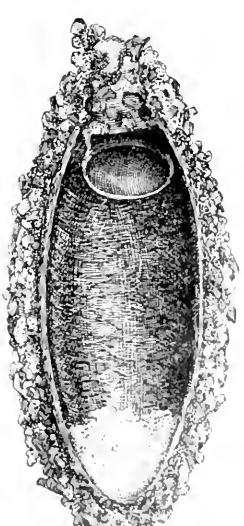


Fig. 7.
Cocoon of E. extraneus

first three pairs are not of the chewing type represented by the last pair which is utilized by the larva for coarse work, i. e. biting through the *Gonocephalum* integument and consuming by mouthfuls, the interior of the body. This morphological change in mandibles is common if not usual among carnivorous larvae of Hymenoptera.

The full-fed *Epyris* larva is now very restless, it wriggles about and works itself free of its shrivelled host, leaving it with a gaping ventral hole, and after a brief period commences to form a cocoon. It reaches about for grains of soil which it attaches together with silk, thus forming a rough outer frame in which it spins a very tough and firm cocoon (Fig. 7) that tears cleanly like tinfoil, which it somewhat resembles in being smooth and silvery white within. It measures about 9 by 3 mm. and is a little broader and blunter anteriorly; near this extremity the cocoon is partitioned off squarely from the less firm terminal subconical portion, by a neat disc, which, being rather thin along the edges, is there cut away by the emerging wasp. The upper portion is then easily pierced by the insect. The resting larva within is rather active and bears the plainly visible compound eyes of the adult, as a darker patch on the sides of second thoracic segment. There is nothing remarkable about the whitish *Epyris* pupa (Fig. 8); it much resembles the adult in shape and size and bears no or very few spines or protuberances, so characteristic of many other wasps. The ovipositor is briefly exerted. The cocoon period for August-September was about 23 days, and with 2 1 2 days for the egg stage and 4 1 2 for the larval feeding stage makes the life cycle in the laboratory about a month. Perhaps the life cycle outdoors is more brief, as the *Goncephalum* larva frequently, if not as a rule, lives buried but a few inches in loose soil which during the day is kept very warm by the sun's rays.

The adult wasp is an active flyer and superficially appears much like a *Tiphia* wasp; it may be found at flowers and at

honey-dew on bushes. It probably spends much of its time underground.

The illustrations are the work of Mr. W. R. R. Potter, artist for the Hawaiian Sugar Planters' Association Experiment Station.

Some Observations on the Leaf-Hopper Wasp, Nesomimesa Hawaiiensis Perkins, at Pahala, Hawaii, Feb. 11-April 25, 1918.

BY F. X. WILLIAMS.

This is a slender, glossy black wasp (Fig. 1) about 1 2″ (13 mm.) long frequently observed slowly flying in the more upland cane fields of the Hawaiian Agricultural Co. at Pahala. None was seen below an elevation of about 1,000 feet, and it was found to occur up to 3,500 feet; it was most plentiful, however, in Wood Valley, altitude 1,850-2,200 feet, where its adopted prey, the cane leafhopper (*Perkinsiella saccharicida* Kirkaldy) was for some months very abundant.

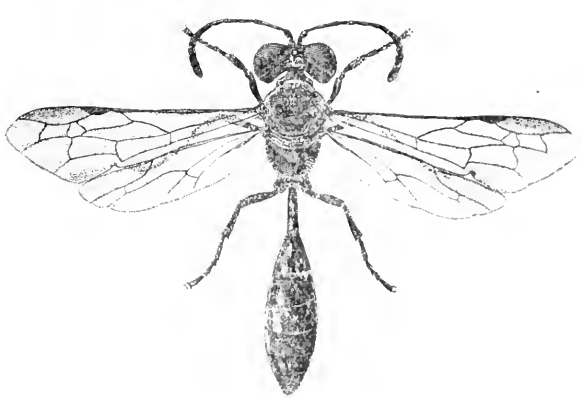


Fig. 1. Nesomimesa hawaiiensis.

Dr. Perkins has observed the Hawaiian Mimesidae storing their burrows with native daddy-longleg flies (Limnobiidae), but it is certain that some attack native leafhoppers as well.

Messrs. Swezey and Bridwell have observed *Nesomimesa antennata* (Smith) in the mountains of Oahu where it was catching *Oliarus*, a native leafhopper of the family Cixiidae, and Perkins in Fauna Hawaiiansis speaks of the unsuccessful efforts of *N. hawaiiensis* to catch Fulgoroid leafhoppers. In a shady gully at Pahala, I have seen both *Nesomimesa* and *Pipunculus* (a fly which parasitizes the cane leaf-hopper) searching the fronds of tree-ferns, and more than once the wasp pounced upon the moult-skins of *Siphanta acuta* Walker, a large green leafhopper, immature specimens of which as well as a smaller species of leafhopper occurred on these ferns. But where the cane leafhopper is to be obtained, both wasp and fly have transferred their attention to it in such a measure that they are often more abundant in the cane fields than in their native forest.

Nesomimesa usually hunts on the wing for her prey, but it cannot be said that she is a particularly good searcher, nor always adept at catching hoppers, and she is sometimes deceived by a cast-skin or a mouldy hopper. As a rule mature leafhoppers form her prey and what small proportion of young I have found in the cells were well grown. Not every grown hopper is suitable, for some reason many may be passed up by the wasp. Making her choice of victim she may poise a few inches before the *Perkinsiella* and make a dash at it, if successful, picking it off the cane with her jaws and legs. Or she may alight on a leaf and locating her victim nearby between leaf bases, with the aid of her wings, pounce upon it at close quarters. On several occasions I saw the wasp sting the hopper. Shortly after the latter is captured, the wasp turns it underside uppermost, and holding it thus in her middle pair of legs, doubles up her abdomen and stings it in the neighborhood of the throat. The sting is administered more than once and the act may be performed either when the wasp is resting on a leaf with her prey or hovering in the air with it.

The wasp easily flies homeward with her quieted victim,

holding it venter upwards beneath her, clasping it about the back of the neck or thorax with the end portion or tarsi of her middle pair of legs so that the spines at the tip of the tibiae are brought across the hopper's throat. Being held only by the wasp's middle pair of legs the hopper hangs obliquely under its carrier.

I noticed several *Nesomimesa* burrows in the vertical bank of a creek bed at the lower Wood Valley Station, altitude 1,850 feet. Above the rich soil was a layer of "pahoehoe" or layer lava which doubtless prevented excessive moisture from seeping through to the burrows. The latter from one to several feet above the ground in the bank, were sometimes located by the grains of soil heaped up below a burrow. Several wasps were seen examining the bank and occasionally alighting on the soil for a few minutes; but when a wasp was engaged in storing her burrow she usually strove to locate and enter it as quickly as possible. The nest-holes are cylindrical and enter the bank at a slight angle from the horizontal. The main shaft is 6-8 inches long and sometimes ends quite steeply, giving off here rather long branches, each terminating in a spacious oval cell about 15 mm. long and 8.5 in greatest

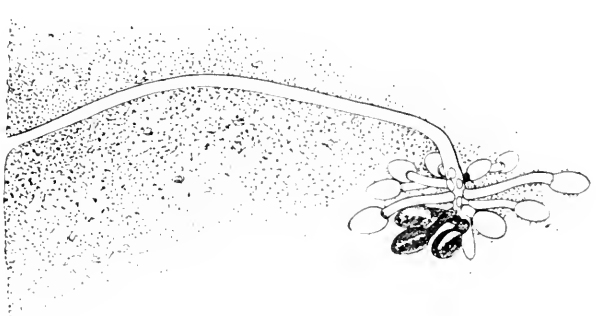


Fig. 2. Burrow and nest of Nesomimesa hawaiiensis.

diameter. These cells which may number 18 to one nest are horizontal or nearly so, and the passage to them plugged with soil up to the main burrow (Fig. 2). This seems sometimes to be done even when the cell in question is not yet completely

provisioned. Where several nests are in close proximity their respective cells cannot always be associated. One nest which I laid bare had three cells, an older one showed twelve, while a completed one had eighteen, each containing a wasp cocoon. The twelve-cell nest had 3-16 hoppers to a cell, but in some instances the cells were not yet completely provisioned, while others contained large larvae or cocoons with a few perfect hoppers and a quantity of small fragments of the provisions.

None of these or other interned hoppers showed any movement, in fact some were not in good condition, among them being mouldy specimens. But one egg is laid to a cell. The egg is glued on the underside of one of the hoppers, being secured longitudinally thereto so that its anterior or head end is near or touches the base of one of the fore legs of its host. The egg is very slightly curved, several times longer than its thickness which is nearly uniform throughout, being very little more bluntly rounded at its anterior than at the posterior extremity. It is 2.5 mm. in length and pearly white.

The larva hatches probably in about two days and devouring its store of provisions at the end of about six days more, commences to spin its cocoon. It is then about 12 mm. long and spindle shaped, the head is of medium size and provided with sharp and slender jaws. The body is well segmented though the lateral folds are not plainly marked, while the whole skin is provided with very fine transparent granulations. The mid-gut is lead color, while both extremities of the body are glassy white. The silken cocoon is rather delicate, surrounded by bits of soil and leafhopper remains, it tapers a little more at the posterior end, measures from 10 to 15.5 mm. long by 3.5 to 5 mm. at its greatest breadth, and is of a light-brown or tan color. A large female pupa (Fig. 3) is about 13 mm. long and is rather stout for so slender an insect, the waist being comparatively thick. The top of the head bears two pairs of spines and the mesonotum a pair of low tubercles. There are no lateral tubercles but the processes on the antennae and legs are knobbed. Its first color is probably pearly white.

Several cocoons which I unearthed April 6 and brought to the Experiment Station yielded adults in the first week of May.

The wasp does its share in destroying leafhoppers; while immensely less numerous than the cane pest, it is nevertheless abundant in some fields, where one female may capture 100 or more hoppers for provisioning her nest. In a twelve-celled nest 65 cane leafhoppers were counted, and as this burrow contained three cocoons and one or two other cells in which the provender had been largely consumed, it is quite safe to estimate the number of *Perkinsiella* supplied here as exceeding 100.

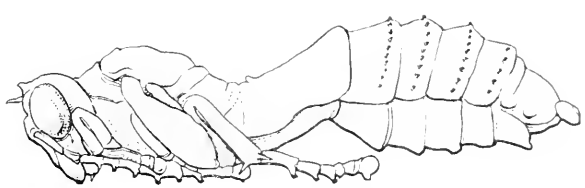


Fig. 3. Pupa of *Nesomimesa hawaiiensis*.

But while *Nesomimesa* has beneficial habits, it does not work in full harmony with the *Pipunculus* fly heretofore mentioned. Be it noted that of the 65 hoppers stored by one wasp, 15 of these were already parasitized by *Pipunculus*. This is a far higher per cent. of *Pipunculus* parasitism (23%) than existed in the adjacent cane field, from which *Nesomimesa* very probably caught her prey, (1.09%). Some of the fly maggots in the cells were alive in the hoppers, and others still, brought in through the medium of their host, were sufficiently far advanced in development as to be able to pupate. Four pipunculated hoppers secured from a wasp's nest failed to produce puparia, and though *Pipunculus* sometimes does hatch in the cells, it is doubtful if they can work their way entirely out of their earthen prison. Possibly the more sluggish behavior of *Pipunculus*-parasitized hoppers in the cell permits of their being captured with greater ease and therefore frequency by the wasp than their more healthy brethren.

Although this wasp works best during the sunshine it will

industrially bring in hoppers in cloudy weather and even as I once observed, during a light rain.

During November I had occasion to visit the Wood Valley region again. The cane leafhopper had disappeared and *Nesomimesa* was pursuing her vocation higher up among the shrubbery of the native forest which flourished at an elevation of several hundreds of feet above the cane fields.

Thus it seems that this wasp which is really a forest insect, may from time to time be compelled to fall back on native leafhoppers as a sparser though more dependable source of food supply for her young than is furnished by *Perkinsiella*, the cane pest.

The figures are the work of Mr. W. R. R. Potter, illustrator for the H. S. P. A. Experiment Station.

Some Observations on Pipunculus Flies* Which Parasitize the Cane Leafhopper, at Pahala, Hawaii, Feb. 11-April 25, 1918.

BY F. X. WILLIAMS.

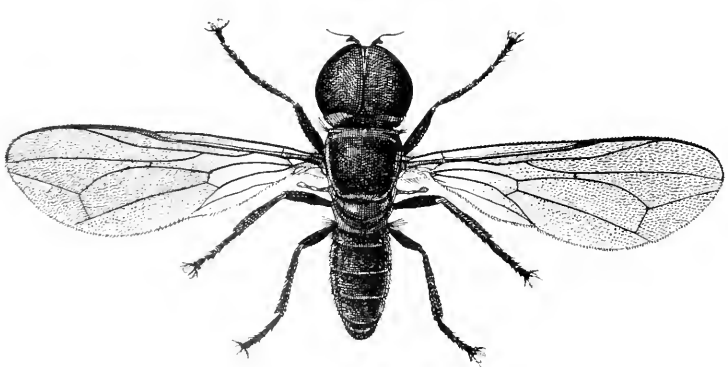


Fig. 1. Pipunculus sp.

This is a rather small blackish fly (Fig. 1) which like the wasp *Nesomimesa hawaiiensis,* has largely transferred its atten-

* Three species of *Pipunculus* were taken at Pahala: *P. juvator* Perkins, *P. hawaiiensis* Perkins and an undescribed species.

tions from native leafhoppers to our introduced pest, the cane leafhopper.

Pipunculus, spending a large part of its existence in flight, is provided with particularly long wings. Its eyes are so far developed as to be contiguous or "holoptic", occupying almost the entire head, while the feet are provided with pads and long claws for snatching up its prey.

Pipunculus is a more widely distributed insect than *Nesomimesa;* it was found on a number of plantations, extending from near sea level to well into the moist forests. Like the wasp, it was most abundant in the Wood Valley region, in places where the leafhopper occurred in some numbers. It is easily recognized by its hovering flight varied now and then by a jerky shift. The male is slightly the larger of the two, his wings are a trifle darker and his flight a little different from that of the female, for where the latter closely scrutinizes cane stems, leaves, weeds, or ground, searching for her prey, the male flies somewhat more hurriedly and does not peer so into retreats, etc., and thus covers more ground. Both sexes are often seen on cane leaves, feeding on dew or honeydew. The male carries his mate about and both are often thus taken on the wing.

On numerous occasions I have seen *Pipunculus* capture her prey and sometimes several of these huntresses could so be seen at one time. One is not always impressed with the fly's selection of hunting grounds, and like *Nesomimesa*, she is sometimes deceived, though only for the moment, into snatching at leafhopper moult-skins. The victims selected are very small to perhaps a little less than half-grown leafhoppers. A suitable one being discovered by the hovering fly is suddenly pounced upon and snatched up in the air. The captive is sometimes dropped almost immediately as if unsuitable, others, however, are held in mid-air for from one to several seconds; the fly usually rising a little with her burden which would be dropped on a leaf or on the ground. Often immediately thereafter, *Pipunculus* would hunt out another hopper showing that

she must have several eggs ready for laying. While in the air with her victim, her abdomen could be seen curved towards it; she is provided with a sharp corneous ovipositor, with which she either pierces the hopper's body or inserts her very small egg (not seen) under a body fold. At any rate the liberated homopteron seems unhurt and usually hops away. If the young hopper is too large, the fly is sometimes apprised of the fact by being hurled back by the insect's vigorous leap.

In catching recently pipunculated hoppers, I found it best to sit down before a sort of clearing among cane plants, shake down a number of hoppers and place leaves bearing many young, in suitable positions and with a white cloth or handkerchief held beneath her, carefully but quickly follow a burdened *Pipunculus*. As soon as the hopper is liberated, it falls on the cloth and a wide-mouthed vial is clapped over it. I was unsuccessful in many attempts but managed thus to secure 6-7 parasitized hoppers in about an hour.

The life of the young *Pipunculus* is rather long, inasmuch as it is not ready to leave its host's body until some time after the latter has become mature. Then a male hopper thus parasitized develops a much swollen abdomen, but I was not able for certainty to distinguish similarly affected females. The latter often have the body normally swollen with eggs, but when pipunculated, these eggs are consumed by the growing parasite. In its early stages, the maggot is rather soft and delicate, in later development it is decidedly tough; then it is tinged with orange, is wrinkled and active and short-oblong in shape.

On April 12th, I captured a few small hoppers which had been caught up and dropped by *Pipunculus*. Some of these were successfully transported to the Experiment Station in Honolulu, where five of them matured in the first part of May. By May 14th one male was seen to have a swollen abdomen and thus to be certainly parasitized, but unfortunately it died shortly thereafter. The last of these hoppers to die, a short-winged female, did so on May 20th, and her abdomen

contained an almost mature *Pipunculus* grub. Thus we may estimate the egg and larval stage of the fly, at the commencement of the warm season as approximately forty days.

The mature grub makes its way out of the hopper's body, thus killing the already sluggish insect, and after some hours forms a very stout, dark-brown puparium. In the cane fields these puparia were not infrequently found at the base of cane leaves or elsewhere on the leaf. The pupal stage at Pahala, 800 feet, for February-March was found to be 28 days in one case and 34 in another.

At first it appeared that the male hoppers were the more often parasitized by the fly; I believe, however, that this was because the parasitism was more easily recognized in that sex. Affected hoppers were very frequently captured by the *Vespa-mimesa* wasp and this seemed to apply particularly to males, as can be seen from the following table for April 4th. One wasp nest contained hoppers as follows:

Males	28	Females	34
Parasitized	14	Parasitized	1

All hoppers here were carefully examined.

The following are percentages of leafhopper parasitization by *Pipunculus*. They are probably underestimated owing to the difficulty of distinguishing small *Pipunculus* maggots.

				Feet Elevation	Leafhoppers Collected	Parasitized	%
Pahala	3	11	Upper Moauia (Field No. 1)	2300	35	4	11.4
"	4	1	Wood Valley Homesteads	2150	100	7	3.57
"	4	3	Wood Valley Homesteads	2150	104	6	5.77
"	4	4	Wood Valley Variety Sta.	1850	63	15	[†]23
"	4	6	Wood Valley Variety Sta.	1850	99	4	4.04
"	4	10	Middle Mud Flow (Field No. 40)	1900	178	4	2.24
	4	22	Mill Field (Field No. 14)	750	82	11	13.4
Olaa	3	15	Mountain View (Field 6)	1500	333	12	3.6
"	3	15	Mountain View (Field 6)	1500	215	10	4.03

[†] Hoppers taken out of nest of *Vespamimesa* wasp.
[*] Many hoppers died.

Dictyophorodelphax praedicta sp. nov. (Homoptera, Delphacidae)

BY JOHN COLBURN BRIDWELL.

Length 5.6-6.4 mm.; length of prolongation of head in front of eyes 2.5-2.8; length of tegmen 1.3-1.6.

Very much like *D. mirabilis* Swezey but darker. The prolongation of the head is shorter, only about the length of the body and the apical depressed portion is much shorter and compressed, the space between the dorsal carinae being acuminate at apex. Lateral carinae confluent at about two-thirds of their length from the base.

The tegmina are shorter than in the other species, the four apical segments of the abdomen being visible beyond them instead of through, as in the case of the other two species. The black dots along the veins are much reduced in comparison with the other species.

The nymphs closely resemble those of *D. swezeyi* Bridwell but the prolongation of the head is slightly deflexed instead of straight.

♂ The genital styles are more elongate than those of *D. swezeyi* and only gently curved, the slender points not being clawlike as are those of *D. mirabilis*. The extreme apices are slightly blunt and recurved.

Fig. 1. Dictyophorodelphax praedicta, edeagus (highly enlarged).

The edeagus has the slender apical portion nearly in a straight line with the not greatly stouter basal portion. The ventral surface of the slender apical portion is covered with many small reflexed teeth and there are two groups of stouter

The figure is the work of Mr. W. R. R. Potter, illustrator for the H. S. P. A. Experiment Station.

teeth on the dorsal surface, one basal and the other at the origin of the apical processes. At about two thirds the distance from the base, the apical slender portion is divided into two apical processes, of which the ventral is stouter and only about two-thirds the length of the dorsal and is dorsally curved. The dorsal process is ventrally curved and somewhat strap-shaped.

In *D. swezeyi* the dorsal teeth are in a single group at the base of the slender portion while the ventral teeth are larger and the teeth are much the same in *D. mirabilis*.

Described from 13 ♀ ♀, 9 ♂ ♂ and one nymph, August 8, 1918 (O. H. Swezey) 21 ♀ ♀, 10 ♂ ♂ and 5 nymphs, Aug. 13 and Sept. 8, 1918 (J. C. Bridwell), collected on *Euphorbia hookeri integrifolia* in Iao Valley, Maui, Hawaiian Islands, at elevations of 600-800 feet on the lower slopes of the ridges rising out of the valley.

Type ♂ and allotype ♀, nymphs and paratypes deposited in the collection of the Hawaiian Entomological Society. Paratypes in the collections of the Hawaiian Sugar Planters' Association, the Bernice Pauahi Bishop Museum, and in the private collections of J. C. Bridwell, O. H. Swezey, and P. H. Timberlake.

My thanks are due to Mr. Frederick Muir for the preparation of the drawing of the edeagus accompanying and to Mr. P. H. Timberlake for the dissections upon which the descriptions of this species and *D. swezeyi* were based.

NOTES AND EXHIBITIONS.

Maui Delphacids.— Mr. Giffard exhibited 6 species of Delphacidae collected on Maui in August by Mr. J. F. Rock, viz.:

From Mt. Eeke, 5,000 feet elevation, West Maui:
1 specimen *Nesorestias* n. sp., or *Ilburnia* n. sp.
If the latter, probably a variety of *I. fullawayi*.

Small series of *Ilburnia fullawayi* var. All off *Argyroxiphium* sp.

From Waikamoi, East Maui, approximately 4,000 feet elevation:

Large series of *Ilburnia* sp. off *Gunnera petaloidea*.

Large series of *Ilburnia* sp. off *Pipturus*.

Small series of *Ilburnia* sp. off *Cyanea aculeatiflora*.

Small series of *Ilburnia* sp. close to *I. blackburni*, off *Cyanea hammatiflora*.

Both sexes and nymphs were represented

Hawaii Delphacids.—Mr. Giffard exhibited a collection of Delphacidae collected by himself on the Island of Hawaii during the months of July and August. With the exception of a few hours collecting in a remote district, the whole collection was taken within a radius of 5 or 6 miles from his residence in Olaa near the Volcano Kilauea. The exhibit included the following:

Series of all the 3 known species of *Nesodryas* from that Island, with the addition of a small series of one new species from *Antidesma platyphyllum*.

A large series of *Nesodryas munroi* from *Dodonea viscosa* var. *spathulata*, which hitherto has only been taken sparsely on the Island of Lanai on the same food-plant.

Of the species of the *Leialoha* and *Aloha* groups, all were collected with a view to sorting out variations in color. A small series of one new species of *Aloha*(?) taken on the sand desert at the Volcano off the common fern, *Nephrolepis exaltata*, will make the fourth of the genus so far taken on the Island of Hawaii.

The genus *Ilburnia* was also well represented by all the species with the exception of one species from Kona (which place was not visited) and two other old species which have not as yet been verified by the capture of males. The common species of this large genus were taken on this occasion

because of variations in color or because of these being attached in numbers to food-plants so far not recorded.

Of the genus *Hburnia*, the collection also included 3 new species in series of both sexes, viz.:

One species off *Coprosma ernodeoides*, taken in Olaa.

One species off *Smilax sandwicensis*, taken in Olaa.

One species off *Lipochaeta subcordata*, taken in the a-a flows at Kahuku, Kau.

Samoan insects.—Mr. Giffard exhibited a second consignment of insects received from Dr. H. C. Kellers, U. S. N., collected at various elevations on the Island of Tutuila of the Samoan group. Of particular interest was the large series of a number of species of Fulgoridae and Jassidae.

Hburnia koae.—Mr. Swezey exhibited a series of this Delphacid collected on koa at Kaiwiki, Hawaii, some of which had shorter tegmina than usual and lacked wings. This form was thought not to have been previously recorded.

Insects from Kaiwiki, Hawaii.—Mr. Swezey exhibited a miscellaneous collection of insects made on a one-day trip to Kaiwiki, Hawaii, in the forest about 9 miles above Hilo. There were 260 specimens, representing about 75 species.

Trypoxylon sp.—Mr. Swezey reported the capture in Hilo of the small undetermined *Trypoxylon* common in Honolulu. This species had not been previously reported from Hawaii. However, when brought to the attention of Brother Matthias Newell, he said he had known of its presence in Hilo for several years but had not recognized it as being distinct from the larger species *T. bicolor*.

Nesodryas eugeniae.—Mr. Timberlake exhibited specimens of this Delphacid taken on *Straussia kaduana*, which constitutes a new host for the species. It was taken on it at different times during the past month.

Nesodryas n. sp.—Mr. Timberlake exhibited specimens of a new species of *Nesodryas* taken on *Kadua*.

Oechalia.—Mr. Bridwell presented notes on this genus of

bugs of which he considered there were five distinct species or sub-species from the different Islands.

Calandra remota.—Mr. Bridwell reported that this Curculionid which he has found in banana stumps at several different places in the mountains and foot hills back of Honolulu, he has recently distinguished in the Experiment Station, H. S. P. A. collections, collected by Mr. Muir in China, Malay Peninsula, Java, Borneo and Amboina. This demonstrated it to be an immigrant in Hawaii.

Alphitobius diaperinus.—Mr. Bridwell reported finding this Tenebrionid beetle in a bag of spoiled mixed feed at Haiku, Maui.

Rhyncogonus lahainae.—Mr. Bridwell exhibited a Curculionid beetle captured by him on Maui, which agrees fairly well with the description of this species.

Maui Delphacids.—Mr. Bridwell exhibited 11 species of Delphacidae recently collected on Maui. They will be worked up by Mr. Muir in a forthcoming paper along with other Maui material.

Jassids from Maui.—Mr. Bridwell exhibited 6 species of Jassidae collected on Maui: 3 species in Iao Valley on *Euphorbia*, *Pipturus*, and *Dodonea viscosa* respectively; 3 species on Haleakala at 6,000 feet, one on *Dodonea* and two on *Eragrostis atropioides* respectively.

Capsid resembling Reduviolus.—Mr. Bridwell exhibited a peculiar Capsid bug resembling *Reduviolus* captured by him on a grass (*Deyeuxia*) at the summit of Haleakala, Maui.

Proterhinus sp.—Mr. Bridwell reported capturing a peculiar species of *Proterhinus* in dead wood of *Cyrtandra* in the mountains back of Tantalus. The species has long spinous setae and is evidently an undescribed form, but the specimen unfortunately is defective, having lost its head. The species differs from *P. blackburni* Sharp in having the subsutural ridges produced forward in front of the anterior margin of the elytra much as in *P. deinops* Perkins, which is otherwise very different.

NOVEMBER 7TH, 1918.

The one hundred fifty-eighth meeting of the Society was held in the usual place. Members present: Messrs. Bridwell, Ehrhorn, Giffard, Mant, Muir, Rosa, Swezey and Timberlake. As none of the officers were present at the opening hour, Mr. Giffard was chosen as chairman of the meeting, and he appointed Mr. Swezey as secretary.

Minutes of previous meeting were read and approved with corrections.

PAPER.

Studies in Rhynchophora (Coleoptera). V. The Genus Rhyncogonus.

BY DR. DAVID SHARP.

(PRESENTED BY MR. F. MUIR.)

Rhyncogonus Sharp, 1885.
Tr. Dublin Soc., Ser. 2, Vol. III, p. 176.

When I established this genus, I indicated its relations to *Celeuthetes* and *Elytrurus*. These two genera are placed by Lacordaire in the division Celeuthetides, and it would therefore appear that I was of opinion that *Rhyncogonus* is a Celeuthetid, though I specially pointed out its similarity to *Otiorhynchus*, which Lacordaire considers to be a member of a group of general (*Otiorhynchides vrais*) distinct from Celeuthetides. In order to settle the position of this interesting and important division of the Hawaiian fauna, I have reinvestigated the question, with the result of finding that *Rhyncogonus* has characters so peculiar that it should form a separate group of Otiorhynchidae that may be called *Rhyncogonides* triba nov. The chief character of the group consists in the form of the buccal cavity; this is not filled externally by the mentum, so that the maxillae are visible for all their length, while the maxillary cleft extends backwards beyond the junction of the

mentum with the head-surface so that a short gular peduncle exits. This is a great peculiarity in the Otiorhynchidae, where it is the rule that the maxillae are quite or nearly covered by the mentum, this point of structure being in fact that on which Lacordaire founded his Legion Adelognathi, so that the condition we find in *Rhyncogonus* would suggest its removal from the Otiorhynchidae, and that it should find a place in the Phanerognathi, among the host of forms of which legion there is so far as I know nothing at all allied to *Rhyncogonus*.

The Phanerognathous condition of the mouth is most completely displayed by *Rhyncogonus koebelei*, but it exists in all the other species of *Rhyncogonus* I have been able to see, though to a less conspicuous extent.

Some of the Celeuthetides have the mouth not completely Adelognathus (e. g. *Elytrurus*), and it is probably to these that *Rhyncogonus* is nearest, but the Celeuthetides have also the corbels more or less modified whereas they are quite simple in the Hawaiian genus. The Celeuthetides are specially characteristic of the Polynesian area, and we shall not be far wrong I believe if we consider that *Rhyncogonus* is a Celeuthetid form, with more simple (or primitive) conditions of the mouth and tibiae.

NOTES ON SOME SPECIES AND THE MALE CHARACTERS.

The material for an exhaustive study of *Rhyncogonus* is at present far too small for any attempt at a revision—much less a monograph—of the genus, but I hope the following notes based on some specimens from the collections of Dr. Perkins and Mr. Giffard may prove useful.

Rhyncogonus blackburni Sharp.

This species as it stands at present is very variable, and it is possible that there may be more than one standing under the name. I have examined to a slight extent the male genitalia of a few specimens, and I find differences among them, but so slight that importance cannot be attached to them unless

the slight distinctions should be found of importance when a good examination of a number of examples is made. Figure 1 shows the male structure fairly well of an example from Tantalus, Oahu (1500 ft.) with the sac extended. In other specimens the shape of the membranous part of the sac is a little different, and the shape of the apical portion of the median lobe itself is not quite the same.

Rhyncogonus sp. (?)

In the Giffard collection there is one specimen that appears to be a new species. It is a male, found in dead leaves at Helemano, Oahu. It is scarcely 6 mm. and has somewhat the appearance of a minute *blackburni* with flat shining elytra, white hair extending all the length of the side of the thorax. The male organ has been examined; the apical portion of the median lobe is unusually short and broad. This specimen has been labelled by me as R. 18.

Rhyncogonus koebelei Perkins.

This was described from a single male example, but was subsequently reported by Dr Perkins as being plentiful in the Manoa Valley on Oahu. The species is the most remarkable of the genus, the maxillae being completely exposed, and the eyes not prominent. There is a small series from Palolo Valley, Oahu, in the Giffard collection, including both sexes. In the male the median lobe has the apical portion much prolonged and the tip curved upwards. The sac appears to be almost cylindrical, and the large transfer apparatus to be so placed as to continue the axis of the sac, but only one specimen has been seen and confirmation is desirable.

Rhyncogonus sp. n. (?)

In the Giffard collection there are two males of a form very closely allied to *koebelei*, but with obsolete sculpture on the thorax, the elytra a little differently shaped, being rather shorter, more convex and with indistinct lateral margin. The buccal cavity and the eyes are quite as remarkable as they are

in *koebelei*. The apical portion of the median lobe of the aedeagus (Fig. 3) is not so prolonged, and this would seem to point to a really distinct species. Waimano Mountains. Labelled R. 6.

Rhyncogonus sordidus Perkins.

I refer a small series of specimens in the Giffard collection from the Island of Lanai to this species, and with much doubt two from Oahu. In the specimens examined from Lanai the apical portion of the median lobe is broad, comparatively short, and with very slightly curved upwards tip. I think the Oahu form has a still shorter apex of the median lobe and a better series might show it to be distinct.

Rhyncogonus sp. n. (?) near **R. stygius.**

Three specimens (1 male, 2 females) from *Freycinetia*, Wahiawa, Oahu, are probably yet another new species. It is a large form, perhaps a little smaller than *blackburni*, with rostrum rather longer, and the snout less dilated, the eyes less prominent. The aedeagus of a specimen labelled R. 4 suggests a close relationship with *blackburni*.

My examination of the male organs, inadequate as it is, shows that the male copulatory apparatus is of a simple nature, very common in Otiorhynchidae, and that different species in this genus exhibit only slight distinctions. In fact this seems to support the theory that all the species may have arisen in the Islands from a single species. A careful examination of numerous specimens with a view to ascertaining the constancy or variation of this organ is eminently desirable.

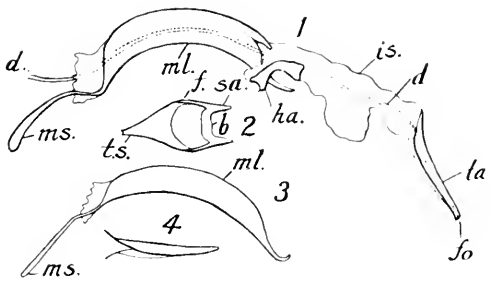
In his review of the genus in the Introduction to the Fauna Hawaiiensis, Dr. Perkins enumerated 24 species of *Rhyncogonus*, and mentions that none is known to occur on Hawaii. Mr. Giffard has, however, found a species there, of which description follows:

Rhyncogonus giffardi sp. n.

Fusco-niger, parce griseo-squamous, antennarum funiculo tibiusque subflavescentibus, elytris convexis ad latera minus discrete carinatis; oculis mediocriter convexis. Long. inc. rostr. 8 mm.

Hab. Insula Hawaii.

The only specimen is in bad condition, but is certainly a distinct species, and as the genus has been hitherto unrepresented in the Island of Hawaii, it is well to name this species, and it is due to its discoverer, W. M. Giffard, that his name should be associated with it.



EXPLANATION OF FIGURES.

Fig. 1. Median lobe, *Rhyncogonus blackburni*, internal sac extended.

Fig. 2. Tegmen, *R. blackburni*, dissected off the median lobe, which it encircles.

Fig. 3. Median lobe of *R. koebelei*, sac not extended.

Fig. 4. Transfer-apparatus of *Rhyncogonus* sp. near *koebelei*.

Lettering is uniformly as follows:—b. bridge of tegmen; d. duct; f. fork of tegmen; f. o. functional orifice; h. a. hinge-apparatus; i. s. internal sac (usually quite hidden); s. a. superior appendage of tegmen; t. a. transfer apparatus; t. s. tegminal strut.

In facies intermediate between *R. vestitus* and *R. simplex*, and may be placed near the latter, from which it is distinguished by the denser pubescense and by the elytra markedly acuminate at the apices. Eyes about as convex as in *simplex*. Thorax densely punctate with a smooth space along the middle near the front, the pallid pubescense forming a rather large patch at the sides behind, elsewhere scanty. Elytra with more

pubescense, forming irregular patches, which however allow the sculpture to be seen. It consists of series of moderately large punctures. Underside rather strongly punctured at the base of the abdomen. The mentum allows the maxillae to be seen at its sides but only slightly.

The specimen is a male, with the abdomen rather deeply impressed at the base, and much hair on the terminal segment. It was taken on *Acacia koa* at Puuwaawaa, North Kona, Hawaii, at an elevation of 3700 feet, August 8th 1917.

The type is in the collection of Mr. W. M. Giffard.

NOTES AND EXHIBITIONS.

Cryptorhynchine beetle in ginger.—Mr. Swezey exhibited an adult weevil found in rhizones of the common white ginger (*Hedychium coronarium*) at the grounds of George Sherman, Nuuanu, November 4th, 1918. It was apparently a beetle that had not been noticed before. A small patch of the plant was being killed out. Several larvae and pupae and two beetles were found among the much-eaten rhizomes.

After some discussion, a motion carried that in co-operation with the Board of Agriculture an attempt be made at tracing the distribution of the pest and employing means of eradicating it. As a Committee for this purpose Messrs Ehrhorn and Swezey were appointed.

Cerambycid beetle.—Mr. Bridwell exhibited a specimen of the same Cerambycid beetle which was reported by him at the July, 1917, meeting as having reared from dead papaia leaf stems, and at the June, 1918, meeting from pods of *Acacia farnesiana*. The species has not been determined yet, but it was collected by Mr. Williams in the Philippines, where it was the prey of certain wasps whose habits he was observing. Hence, it is to be considered an immigrant from the Philippines.

Considerable discussion followed in regard to methods by

which immigrant insects may arrive in spite of present efficient quarantine methods.

Mr. Giffard related the manner in which certain termites reached Honolulu in army bed cots from the Philippines after the Spanish-American War, became established at the waterfront and have spread to other parts.

Mr. Ehrhorn related the intercepting of termites in a shipment of banana plants and yams from the Philippines. They were in great quantities in the shipping boxes, and were promptly incinerated in the plant quarantine laboratory.

Mr. Muir reported that it is believed the rhinoceros beetle was introduced into Samoa in the sleeping mats of immigrants from India, as it had been found under such circumstances.

Jassid on Amaranth.—Mr. Ehrhorn exhibited specimens of a small green Jassid collected by him recently on the weed, *Amarantus spinosus*, near his office at the waterfront. It was apparently a different species from the other similar Jassids occurring on grasses here, and probably is a new immigrant.

DECEMBER 12TH, 1918.

The one hundred fifty-ninth meeting of the Society was held in the usual place, Vice-President Timberlake in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Giffard, Grimmell, Muir, Potter, Rosa, Swezey and Williams.

Minutes of previous meeting read, corrected and approved.

In behalf of the Committee to investigate the ginger weevil, Mr. Swezey reported that all the infested plants at Mr. Sherman's residence had been dug up and burned. Later, the weevil was found in a patch of ginger on the Tantalus Trail, near the Schaefer residence, but other patches of ginger at higher elevations on Tantalus and in Nuuanu Valley were found uninfested. He had reared adult specimens from larvae previously brought in. Mr. Ehrhorn reported that an examination of the records of quarantine inspection disclosed no record

of infested ginger; that the market contained no infested ginger so far as he had found; and that other kinds of ginger than *Hedychium coronarium* including the red ginger of Fiji, another species with cone-shaped flowers and still another low form, probably a native species, were examined and no trace of infestation found. After some discussion, it was voted that the report be accepted in course and in view of the prevailing opinion that the pest might be eradicated if prompt and vigorous action were taken, the Secretary was instructed to address the Superintendent of Forestry asking the coöperation of the Board of Agriculture and Forestry to this end, stating at the same time that whatever assistance could be rendered by individual members of the Entomological Society would be gladly given.

Messrs. Swezey and Fullaway were appointed a committee to prepare a memorial for Mr. H. O. Marsh, a former member whose death had recently been noted.

PAPERS.

New Hawaiian Delphacidae (Homoptera).

BY F. MUIR.

The list of Hawaiian Delphacidae has been considerably increased during 1918. This is chiefly due to the activities of Messrs. Bridwell, Fullaway, Giffard, Rock and Swezey. In the present paper eighteen new species, one new sub-species and two new varieties are described, but a considerable portion of the collected material has not yet been worked, chiefly consisting of a collection made by Mr. W. M. Giffard in Hawaii. This latter material contains several new species. An extension of localities has been noted for several species, and the food plants of most of the new species and of some of the old ones are recorded. The taking of *Nesodryas laka* (Kirk.) and *Ilburnia monticola* (Kirk.) is of interest as no specimens of

these two species existed in the collections in the Territory. The finding of more specimens of *I. osborni* (Muir) shows that the aedeagus of the single specimen from which the species was described was damaged. The *cyathodes* group shows some interesting features for here we have certain chrootic changes, which in other groups of Delphacidae are of generic value, while the genitalia remain practically unchanged.

All the new species show as great a phallic differentiation as the old. In this question of phallic differentiation lies the chief problem of the evolution of the Delphacidae, especially of the evolution of species. Work done by Mr. Giffard on North American Delphacidae shows the same diversity of the genitalia as I have found among the Hawaiian and Oriental species.

Mr. Timberlake made dissections and mounts of his own material and that of Mr. Bridwell, and Mr. Giffard prepared mounts and drawings of the material collected by himself, and Messrs. Fullaway and Rock, so that to a large extent I am only the recorder of these new species.

The types are all deposited in the collection of the Hawaiian Sugar Planters' Association, Honolulu. Measurements are from the apex of vertex to the anus and from the base to apex of one tegmen.

The generic name *Ilburnia* has been used in place of the better known *Nesosydne*, but the change is unavoidable.

Kelisia Fieb.

Kelisia eragrosticola, n. sp. Pl. IV, f. 2.

Male. Brachypterous; length 2.6 mm.; tegmen 1 mm. Vertex slightly longer than the width at base, apex slightly conically produced, narrower than base, sides straight, converging towards apex, the Y carina obscure, the diamond-shape cell not reaching the apex; length of face about twice the width, widest about the middle, median carina simple; antennae reaching about the middle of clypeus, first joint half the length of the second. Pronotum about as long as vertex, lateral carinae straight and slightly diverging to near hind margin, then slightly converging and reaching the hind margin. Tegmina not reaching to the middle of abdomen. Hind tibiae longer than tarsi, first tarsus subequal to the other

two together. Spur slightly shorter than the first tarsus with many small teeth on the hind margin.

Opening of pygofer large, deeply emarginate on ventral edge, less deeply on dorsal edge, and segment fitting into dorsal emargination, short, each ventral corner produced into an apically truncate spine; genital styles strongly curved, slightly flattened, broadest on basal half, apex bluntly pointed, aedeagus subcylindrical, flattened and curved on apical half, apex rounded, orifice on outer side of the curve near apex, a row of small teeth along the apical half continuing along the right side, the teeth on the dorsal aspect near the middle forming a small comb, on the ventral aspect near the end of the row of teeth are some teeth forming a small, irregular comb curving to the left side.

Pale orange yellow, pale or whitish over the carinae of pro- and mesonotum and continued as three marks down the dorsum of abdomen with an outer light line on pleura of abdomen, carinae of vertex and face light, between carinae more or less fuscous, darkest along the carinae, two irregular, longitudinal dark marks down antennae, two longitudinal brown marks on femora and tibiae, genital styles, ventral portion of anal segment and middle of diaphragm brown. Tegmina pale orange yellow, veins slightly lighter than membrane, granules very obscure, a few small, black hairs, a small black mark on hind margin at apex of clavus.

Female. Brachypterous; length 3.1 mm.; tegmen 1 mm. Similar in color to the male.

Macropterous; length 3.3 mm.; tegmen 3.3 mm. Apical veins brownish and a dark mark on the hind margin at apex of clavus; wings with brown veins.

Habitat. Iao Valley, Maui. (*Giffard* and *Fullaway*, May, 1918) on *Eragrostis variabilis*. One male from the same locality and food plant (*Bridwell*, August 1918).

Described from forty-seven males, fifty females and a few nymphs. The nymphs show the three longitudinal pale marks very distinctly and are inclined to be slightly darker than the adults.

The genitalia of this species are of interest as they show the transmission from *K. swezeyi* and *K. sporobolicola* to *K. emoloa*.

K. sporobolicola Kirk. Pl. IV, Fig. 13.

Previously I figured the left side of the aedeagus of this species* but as the chief row of spines are on the right side I

* Proc. Haw. Ent. Soc., III:4, Pl. V, f. 21 (1917).

now figure that aspect. A long series from Puu Nianiau, Haleakala, Maui, about 7000 feet elevation (*J. C. Bridwell*, August 1918) on *Eragrostis atropioides*. One of these is a macropterous female. In general color they are darker than the average Oahu specimens.

Leialoha Kirk.

Leialoha lehuae mauiensis, n. var.

In coloration this is near to *L. lehuae hawaiiensis* and it varies in the same manner. The aedeagus is closely related to it as well, but has no small spine at the apex but one near the apex of the crook.

Habitat. Olinda, Maui, 4200 feet elevation (*Giffard* and *Fullaway*, May 1918) on *Coprosma montana*. Four males, three females and thirteen nymphs. This is the first *Leialoha* taken on Maui.

Nesodryas Kirk.

Nesodryas fletus (Kirk.)

One female from Lupe ditch, Maui (*Giffard* and *Fullaway*, May 1918) on *Antidesma platyphyllum*. The marks on the face are darker and more distinct than usual.

Nesodryas (Nesothoe) laka (Kirk.)

One male, three females and two nymphs from ridge south of Iao Valley, Maui, 800 feet elevation (*Bridwell*, August 1918) on *Sida*. These conform fairly well to Kirkaldy's description which was made from one female, and are the only specimens taken since the type.

N. (Nesothoe) munroi Muir.

Nineteen males, thirty females and nymphs on *Dodonea viscosa* var. *spathulata*, A-a flows, Kau, Hawaii, 3600 feet elevation (*Giffard*, July 1918).

N. (Nesothoe) gulicki Muir.

Twelve specimens on *Euphorbia* sp., Nuuanu Pali (*Giffard* and *Muir*, December 1918).

The figure of the aedeagus of this species* is not very good. The orifice is at the apex, from the left edge of the orifice arises a small spine, a little basad and slightly more ventrad is a larger spine expanded at the apex with some small projections on the expanded portion, basad of this and on the right side there is a small spine curved distad and with a minute spine about the middle.

A long series from middle Puna, Hawaii, 750 feet elevation, on *Metrosideros collina polymorpha* var. *glaberrima*. Several specimens in this series are very light in color, especially some of the females in which most of the color on the tegmina is faded out. Also three specimens from 23 miles, Olaa, Hawaii. (*Giffard*, August 1918).

Aloha Kirk.

Aloha ipomoeae Kirk.

A long series from the sea shore at Olowalu, Maui, some off of *Ipomoea pes-caprae* which are all light in color, and others on *Ipomoea pentaphyllum* which are all much darker in color. Three adults on *Ipomoea insularis* from Iao Valley, Maui, also belong to the dark variety (*Giffard* and *Fullaway*, May 1918).

Two males, five females and young on *Sesbania tomentosa* and one male and eight female on *Ipomoea pes-caprae*, from Momomi, Molokai (*Rock*, June 1918). These are all light forms.

Ilburnia White.

I. pseudorubescens (Muir.)

Two male specimens from Olinda, Maui, 4200 feet elevation, one taken on *Lobelia* sp. and the other on *Acacia koa*, which I consider to be this species (*Giffard* and *Fullaway*, May 1918).

I. tetramalopii n. sp. Pl. III, f. 7, Pl. IV, f. 19.

Male. Brachypterous; length 1.6 mm.; tegmen 1.3 mm. Length of vertex nearly double the width, apex subconical, sides subparallel to near

* Proc. Haw. Ent. Soc., III (1916), Pl. 2, fig. 13.

apex, base about middle of eye; length of face 1.7 times the width, sides slightly arcuate, median carina simple; antennae reaching a little beyond base of clypeus, first joint half the length of second; legs short, hind femora not reaching beyond apex of abdomen, tibiae longer than tarsi, first tarsus about equal to the other two together, spur as long as first tarsus. Tegmina reaching to eighth abdominal tergite.

Opening of pygofer large, about as long as broad, round, (in the figure the anal segment is shown greatly elevated and so the shape of the opening looks longer than broad, when the anal segment is in repose the shape of pygofer is more like that of *bridwelli*), dorsal emargination large, wide, embracing about half the anal segment, anal angles not produced; anal segment with two short spines on the underside not very near together; genital styles flat, broad, apex truncate with the angles slightly produced, outer and inner edges slightly concave; aedeagus flattened laterally, slightly curved, broadest in middle, considerably narrowed at apex which is produced into a small point, right side with three small, flattened spines, left side with two spines.

Dark auburn or black, antennae, carinae of head and thorax, between the carinae of pronotum and over the mesonotum, median portion of pygofer and seventh and eighth abdominal tergites pale orange; legs light with longitudinal markings on femora and tibiae, apical tarsi dark. Tegmina opaquely or milky white, veins whitish with black granules bearing black hairs, a black mark at apex of clavus. The opaque whiteness varies, the membrane in some specimens being clear with brownish markings.

Female. Brachypterous; length 2 mm.; tegmen 1.1 mm. In color the female is generally lighter than the male.

Habitat. Haleakala (near the summit), Maui, 7000 feet elevation (*Bridwell*, August 1918) on *Tetramolopium humile*.

Described from fourteen males, fourteen females and twenty nymphs. The nymphs are light in color with darker markings somewhat similar to the adults but not so extensive, the tegminal pads are mostly all dark.

This species is very distinct and I cannot place it very near to any other species at present.

I. argyroxiphii (Kirk.)

I have not seen a male of this species. A female specimen taken by Swezey at the same time as the male figured by Kirkaldy* has the following dimensions:

Length 3.0 mm., tegmen 1.2 mm.; length of vertex 1.3

* Proc. Haw. Ent. Soc., 1, Plate 4, fig. 6.

times the width, slightly widened towards the apex which is slightly rounded, base slightly in front of the middle of eye; length of face twice the width, sides slightly curved, median carina simple; antennae reaching slightly beond the base of clypeus, first joint half the length of second. Tegmina reaching base of fifth segment; hind femora considerably longer than tarsi, first tarsus longer than the other two together.

It is possible that this comes into the same group as *I. bridwelli* and *I. tetramalopii* but there are several distinct differences in structure.

I. monticola (Kirk.) Pl. IV, f. 10.

Vertex slightly longer than wide, apex slightly and broadly conical; length of face more than twice the width, median carina simple; antennae reaching to the base of the clypeus or slightly beyond, first joint about half the length of second.

The genitalia are close to those of *I. leahi* (Kirk.); the pygofer is slightly narrower, the anal spines large and diverging with a lobe from the anal segment basad of the spines, the genital styles are bent slightly more in the middle than is the case in *I. leahi;* aedeagus figured.

A long series of both sexes and nymphs from Haleakala, Maui, 7000 feet elevation, (*Bridwell,* August 1918) feeding on *Coprosma montana.*

I. rubescens (Kirk.)

Five males and one female, Haleakala, Maui (Puu Nianiau) on the phyllodia of *Acacia koa* (*Bridwell,* August 1918).

I. bridwelli n. sp. Pl. III, f. 3, Pl. IV, f. 20.

Male. Brachypterous; length 2 mm.; tegmen 1.5 mm. Length of vertex nearly double the width (1 to 1.9), sides subparallel, apex slightly conical, base well behind the middle of eye; length of face nearly two and one-half the width (1 to 2.4), sides slightly curved, median carina simple; antennae reaching slightly beyond base of clypeus, first joint half the length of second; hind femora not reaching beyond apex of abdomen, hind tarsi nearly equal in length to the tibiae, first hind tarsus equal to the other two together, tegmen reaching to anal segment.

Opening of pygofer large, wider than long, sides well rounded, dorsal emargination large, embracing about half the anal segment; spines on anal segment large, stout, not near together; genital styles flat, broad, widest at apex which is truncate with the lateral angles produced, narrowest in middle, (in a flat, lateral view the narrowness is not so great); aedeagus flattened laterally, rounded at apex, functional orifice near apex

on ventral aspect, three small curved spines near middle of dorsal aspect and one smaller spine more distad on right and two on the left side.

Black or brown; antennae, carinae of head and thorax lighter, legs brownish with darker longitudinal marks, apical tarsi brown, base of abdomen, dorsal aspect and edges of pygofer and a narrow stripe down abdominal dorsum yellowish or light brown. Tegmina hyaline slightly opaque or milky white with slight infuscation over the middle area veins concolorous as membrane with black granules bearing black hairs, a dark mark at apex of clavus and another at apex of costal cell and at apex of cubitus.

Female. Brachypterous; length 2.4 mm.; tegmen 1.7 mm. In color lighter than the male, being light brown. One female, perhaps immature, being yellow with tegmina immaculate except for the black granules which are very small.

Habitat. Haleakala, Maui, about 7000 feet elevation (near the small crater of Pun Nianian) on *Argyroxiphium virescens*. (*Bridwell*, August 1918). Described from two males, four females and one nymph. The nymph is dark brown, lighter on carinae, at base of abdomen and mottled over tegminal pads.

This species comes near to *I. tetramalopii*.

I. cyathodis (Kirk.)

The forms associated under this species are of great interest as among them we have considerable chroötic but practically no phallic differences. Among continental faunae the differences found in such a form as *ceke* would be considered as of generic value, judging by some of the European and American genera. But as my studies of Hawaiian Delphacidae have been primarily based upon the genitalia, and as there is no doubt as to the close affinity of the forms in question, I prefer to associate them under *cyathodis* as subspecies and varieties,

After examining the new material from Maui I consider *fullawayi* as of only varietal value. The five forms I now class as follows:

Ilburnia cyathodis (Kirk.)
var. *fullawayi* (Muir)
var. *lanaiensis* (Muir)
var. *nigrinervis* Muir
subspecies *ceke* Muir.

I. cyathodis nigrinervis n. var.

Male. Brachypterous; length 1.5 mm.; tegmen .6 mm. Vertex as long as broad, apex slightly roundly produced, sides parallel, base in front of the middle of eye, head nearly as broad as thorax; length of face twice the width, median carina simple; antennae reaching barely to base of clypeus, second joint 2.6 times the length of first, first about as long as broad; hind femora not reaching beyond the apex of abdomen; tibiae longer than femora, tarsi equal to tibiae, first tarsus equal to the other two together; tegmina reaching to base of sixth segment.

Light brown over face and vertex, darker over apical portion of face and over clypeus, dark brown on thorax and black over abdomen. Tegmina hyaline, slightly opaque and faintly fuscous or brownish over the greater area, the apical cells clearer, all the veins fuscous or brownish. Fine, short hairs sparsely cover the head, thorax and abdomen, more perceptibly so on the face.

Female. Brachypterous; length 1.9 mm.; tegmen .9 mm.; in color lighter than the male.

Habitat. Haleakala, Maui (*Swezey*, August 1918) on *Cyathodes* sp. Described from thirteen males and sixteen females. There is one male specimen in the Bridwell collection from the same locality (7000 to 8000 feet elevation) on *Staphylea grayana* (*Cyathodes*).

I. cyathodis lanaiensis (Muir.)

Three males, four females and a nymph from Iao Valley, Maui, (*Bridwell*, August 1918) on *Cyathodes* sp.

I. cyathodis eeke n. subsp.

Male. Brachypterous; length 2 mm.; tegmen .8 mm. Vertex slightly longer than broad (1 to 1.20), sides parallel, apex slightly rounded, base about middle of eyes; length of face twice the width; head nearly as wide as thorax; antennae reaching to base of clypeus, scond joint 1.2 times the length of first, lateral carinae of pronotum straight, slightly diverging, reaching hind margin. Tegmina reaching to middle of fourth abdominal segment.

Head, thorax and legs dirty pale yellow orange, fuscous between carinae of head; dark, longitudinal marks on legs, abdomen black. Tegmina dirty pale yellow orange, veins without granules with very fine light hairs.

Female. Brachypterous; length 2.3 mm.; tegmen .8 mm. Similar in color to the male but abdomen often lighter.

Habitat. Mount Eeke, West Maui, 5000 feet elevation (*J. Rock*, August 1918) on *Argyroxiphium* sp.

Described from thirteen males and nine females. There is some little variation in color, the marks on the legs fading out entirely.

The genitalia of this subspecies is the same as in *I. cyathodis*, otherwise it differs in having a longer and narrower vertex, the tegmina are much shorter and the whole insect is proportionally longer and narrower.

I. longipes n. sp. Pl. III, f. 4; Pl. IV, f. 15.

Male. Brachypterous; length 2.3 mm.; tegmen 1 mm. Vertex longer than broad (1 to .8), sides subparallel, apex truncate, length of face more than twice the width (2.25 to 1) slightly broadened on apical half, median carina simple but slightly thickened on basal third; antennae reaching to middle of clypeus or beyond, basal joint very slightly shorter than apical joint; legs long, hind femora reaching beyond apex of abdomen, tibiae considerably longer than femora, tarsi considerably shorter than tibiae, first joint very slightly longer than other two, spur considerably shorter than first tarsus. Tegmina reaching to middle of abdomen.

Opening of pygofer about as long as wide, each anal angle of pygofer produced into rounded process which nearly meet in middle line and nearly surround the anal segment; anal segment without spines; genital styles slightly curved, narrowed in the middle, apical half subdiamond shape; aedeagus tubular, orifice at apex slightly ventrad, two small flanges at base on dorsal aspect, three large spines on dorsal aspect near apex; diaphragm produced into a ridge in middle with a shagreened surface.

Mustard yellow, fuscous between carinae of face and on gena forming two narrow lines on face and continuing onto the apical portion of vertex, brownish between carinae of thorax, on medio-lateral portion of abdomen, apex of labium and claws. Tegmina hyaline, light mustard yellow, veins darker, the subcostal, clavai and middle of the median and cubital cells brownish, a darker mark running over the membrane from base of subcostal cell to apex of clavus; granules very sparse and minute bearing black hairs.

Female. Brachypterous; length 2.7 mm.; tegmen 1.3 mm. Similar in coloration to male.

Habitat. Olinda, Maui, 4200 feet elevation. (*Giffard* and *Fullaway*, May 1918) on *Cyrtandra mauiensis*. Described from three males and one female.

I. coprosmae n. sp. Pl. III, f. 2; Pl. IV, f. 21.

Male. Brachypterous; length 2.5 mm.; tegmen 1.4 mm Vertex very slightly longer than wide, apex slightly broadened and rounded; length

of face two and one-half the width, sides nearly straight, median carina simple; antennae reaching nearly to the middle of the clypeus, second joint one and one-half the length of the first; legs fairly long, hind femora reaching beyond apex of abdomen, tibiae longer than femora, tarsi shorter than tibia, first tarsus longer than the other two together. Tegmina reaching to apex of abdomen.

Opening of pygofer about as long as broad, round; anal segment with two short, thick spines far apart, genital styles medium size, flat, truncate at apex where they are broadest; aedeagus small, laterally compressed, comparatively short and broad, a row of eight teeth along the dorso-apical portion slightly on right side and another on the apico-ventral area slightly on the left side, functional orifice at apex.

Black or dark brown; antennae, carinae of head and thorax, metathorax, anal segment, trochanters, base and apex of tibiae and femora lighter brown or yellow. Tegmina hyaline, fuscous at apex of clavus and expanding in an irregular manner as a faint mark across the corium to costa, the darkest markings being at apex of clavus, near the base and at the apex of the costal cell; veins the same color as the membrane, granules minute with black hairs.

Female. Brachypterous; length 2.6 mm.; tegmen 2.0 mm. In coloration similar to the male.

Habitat. Olinda, Maui, 4200 feet elevation (*Giffard and Fullaway*, May 1918) on *Coprosma montana*. Described from eighteen males and twenty-three females. As is the case in many of these insects there is a considerable range of coloration. It follows the line of the extension of the yellow areas on the head and thorax and of the reduction of the fuscous in the tegmen. Some specimens, especially the females, are very light in color.

I. stenogynicola n. sp. Pl. III, 5; Pl. IV, f. 22.

Male. Brachypterous; length 2.5 mm.; tegmen 1.7 mm. Length of vertex equal to the width at base, slightly narrowed towards apex, apex very slightly rounded; length of face nearly two and one-half times the width (1 to 2.4), very slightly narrowed at base, median carina simple, or forked at the extreme base; antennae not quite reaching to the middle of clypeus, first joint slightly shorter than second (1 to 1.3), legs moderately long, hind femora reaching to apex of abdomen, tibiae longer than femora, tarsi slightly shorter than tibiae, first tarsus slightly longer than the other two together. Tegmina reaching to apex of abdomen, apical cells well developed.

Opening of pygofer about as wide as long, sides slightly angular, anal spines short, stout, near together but not contiguous at base; genital styles moderately short, flat, broad, truncate at apex, narrowed at middle;

aedeagus tubular, slightly curved, tapering to a point at the apex, orifice near apex on ventral aspect, a row of six spines on right side from a dorsal position near apex to a ventral point about one-third from the base, the apical four are small, the fifth much larger, the basal or sixth spine largest, a similar row of spines run across the left side but two of the small spines are very small or missing.

Orange buff inclining to raw sienna, blackish between carinae of head and thorax, abdomen darker. Tegmina orange buff a dark mark at apex of clavus extending as a faint, broken, dark mark to near base of costa, costa dark on apical third, subcosta dark, and media and cubitus dark in middle, granules very small with black hairs.

Female. Brachypterous; length 3.5 mm.; tegmen 2.0 mm. Color similar to male but somewhat lighter over abdomen.

Habitat. Olinda, Maui, 4200 feet elevation (*Giffard* and *Fullaway*, May 1918) on *Stenogyne kamehamehae*. Described from seven males and three females.

This species is very distinct; it appears to go into the same group as *I. oahuensis* (Muir).

I. kokolau n. sp. Pl. IV, f. 4 a. b.

Male. Brachypterous; length 2.5 mm.; tegmen 1.8 mm.; length of vertex nearly one and one-half times the width (1 to 1.4), apex truncate with the median carina projecting, base considerably behind the middle of eye, sides subparallel; length of face twice the width, slightly narrowed at base beyond which the sides are subparallel, median carina furcate to near apex, near together but distinct; antennae reaching a little beyond the base of clypeus, first joint one-half the length of second; hind femora not reaching beyond apex of abdomen, tibiae longer than femora, tibiae slightly longer than tarsi, first tarsus slightly longer than other two together; tegmina reaching base of pygofer.

Anal spines short with wide bases which do not meet together; genital styles flat, outer margin nearly straight, inner margin emarginate on apical third, apex truncate; aedeagus subtubular on apical half, flattened laterally and widened on basal half, orifice on ventral aspect near apex, a few small spines near apex on dorsal aspect and a row of some ten spines from the same area across the right side to near the base, another row of spines from near orifice to near base along a ventro-lateral position on left side.

Ochraceous-tawny; claws, apex of rostrum and spines on legs darker, base of abdomen lighter. Tegmina hyaline, ochraceous-tawny, veins same color as membrane, granules very minute with dark hairs.

Female. Brachypterous; length 2.5 mm.; tegmen 1.8 mm. In coloration similar to the male.

Habitat. Ridge south of Iao Valley, West Maui (*Bridwell*,

September 1918) on *Campylotheca* sp. Kokolau is the generic name by which the Hawaiians know the species of *Campylotheca*. Described from one male and two females.

I place this species in the *cyrtandrae* group.

I. curvata n. sp. Pl. IV, ff. 1, 3.

Male. Brachypterous; length 2.9 mm.; tegmen 2.1 mm. Length of vertex 1.6 times the width, sides parallel, apex slightly rounded, base well behind middle of eye (one-third from back of eye); length of face 2.6 times the width, slightly narrowed between eyes, sides slightly curved, median carina simple with the extreme base slightly thickened; antennae reaching beyond the middle of clypeus, second joint 1.5 times the length of the first; hind femora extending slightly beyond apex of abdomen, tibiae considerably longer than femora and considerably longer than tarsi, first tarsus longer than other two together; tegmina reaching to the base of pygofer.

Opening of pygofer round, dorsal emargination large, genital styles widened on basal half on inner margin and again slightly about one-third from apex, outer margin slightly concave, apex truncate, spines on anal segment long, slender and curved, their bases not near together, aedeagus shaped somewhat like a bishop's crosier with crook at the apex.

Buff-yellow, antennae brown, slightly fuscous between carinae of face and over the carinae of throax, tegulae and a spot on mesopleura brown. Tegmina buff-yellow with a brown mark at apex of clavus and another at apex of costal cell, veins the same color as the membrane with very minute dark granules bearing dark hairs.

Habitat. Lupe ditch, Maui, 1200 feet elevation (*Giffard* and *Fullaway*, May 1918) on *Cyrtandra* sp. Described from one male. The genitalia of this specimen is not in the best condition but it is quite distinct enough to warrant a description and name, as it is so very distinct from any other species described. For the present I place it near *I. blackburni* (Muir).

I. acuta n. sp. Pl. IV, ff. 9, 11.

Male. Brachypterous; length 2.5 mm.; tegmen 1.6 mm. Vertex nearly as broad as long (1 to .9), apex slightly rounded, base at middle of eye, length of face nearly three times the width, slightly widest on apical half, median carina simple; Antennae reaching to middle of clypeus, second joint 1.4 times the length of first; hind femora not reaching beyond apex of abdomen, tibiae much longer than femora and than tarsi, first hind tarsus slightly longer than the other two together; tegmina reaching to base of eighth abdominal segment.

Opening of pygofer about as long as broad, dorsal emargination enclosing about half the anal segment, anal angles of pygofer not produced; anal segment with two short, stout spines; genital styles reaching nearly to the anal segment, flat, narrowest at middle, apex truncate, inner angle sharp, outer angle rounded; aedeagus tubular, straight, apex produced into an acute point, orifice on ventral aspect near apex, four spines on each side about one-third from apex, the more ventral ones the larger.

Pale orange yellow inclining to green; fuscous between carinae of head and thorax, apex of rostrum and claws of feet brown, slightly fuscous on dorsal aspect of abdomen. Tegmina pale orange yellow inclining to green in some specimens, a brown mark at apex of clavus and a small lighter mark at apex of costal cell, the dark mark at apex of clavus continuing as a faint infuscation across the tegmen to the base of costa, veins same color as membrane, no granules but a few fine, black hairs on veins.

Female. Brachypterous; length 2.7 mm.; tegmen 1.8 mm. The dark mark on tegmina not so pronounced as in the male.

Habitat. Ridge south of Iao Valley, West Maui (*Bridwell*, September 1st, 1918) on *Cyrtandra maniensis*. Described from three males and three females.

This species apears to be nearest to *I. osborni* but it is very distinct.

I. waikamoiensis n. sp. Pl. III, ff. 1, 8.

Male. Brachypterous; length 3 mm.; tegmen 1.7 mm. Vertex longer than broad (1 to 1.4), base of vertex at middle of eye, apex very slightly rounded and very slightly narrower than base; length of face 2.5 times the width, sides slightly curved, slightly widened on apical half, median carina simple, slightly thickened on basal third or very narrowly and indistinctly furcate there; antennae reaching beyond the middle of clypens, first joint slightly shorter than second (1 to 1.3); legs long, hind femora longer than tarsi, first tarsus longer than other two together; tegmina reaching to base of pygofer.

Pygofer round, opening wider than long, dorsal emargination deep, nearly surrounding the anal segment, anal angles produced into a bluntly curved point; anal segment without spines; genital styles reaching nearly to anal segment; widest at base and apical third, apex pointed; the armature on phragma forming a long, narrow process standing up from the phragma, the dorsal edge being slightly emarginate where the aedeagus passes over it, the ventral edge rounded, the entire surface shagreened; aedeagus long, semitubular, curved, orifice at apex on dorsal aspect, a row of teeth on each side, that on the left being more dorsad than the right, slightly curved, the teeth slightly longer and their bases joined together forming a narrow flange.

Light orange yellow; between the carinae of face, third tarsi and claws, the medio-lateral portions of the abdominal tergites, pygofer and styles slightly blackish. Tegmina darker orange yellow, a black mark at apex of clavus, slightly fuscous across the middle of tegmina in which areas the veins are slightly darkened, a faint mark at apex of costal cell, granules minute with black hairs.

Female. Brachypterous; length 3.3 mm.; tegmen 1.9 mm. Tegmina reaching to base of seventh tergite. In color similar to male but slightly lighter, the mark between carinae of face being faint or absent.

Habitat. Waikamoi gulch, East Maui, 4000 feet elevation, and Puohaokamoa, East Maui. Described from four males, three females and nymphs taken on *Cyanea aculeatiflora*, one male and one female on *Cyanea* sp. and one male and one female on *Pipturus* sp. (*Rock*, August 1918).

The young are orange yellow with dark claws, until the last stages when darker markings between carinae of face and on the tegmina begin to appear. This species comes into the same group as *I. waitupensis* (Muir) but it is quite distinct.

I. pulla n. sp. Pl. III, f. 6; Pl. IV, f. 17.

Male. Brachypterous; length 1.6 mm.; tegmen .9 mm. Vertex wider than long (1 to .6), apex slightly rounded, sides parallel, base well before middle of eye (two-thirds from hind margin of eye); length of face 2.2 times the width, sides moderately curved, median carina furcate from near apex; antennae reaching beyond base of clypeus, first joint half the length of second; hind femora not projecting beyond apex of abdomen, tibiae slightly longer than tarsi, first tarsus equal to the other two together; tegmina reaching to the middle of sixth segment.

Opening of pygofer a little wider than long, round; anal segment with two large spines near together at base; genital styles reaching nearly to anal segment, flat, widest at the base, narrowed about the middle, apex truncate; aedeagus strongly curved, base broad and laterally flattened, apex rounded, orifice on dorsal aspect near apex, four strong spines on right side on apical half, one on dorsal aspect near apex and four on left side.

Dark brown or nearly black, legs and base of abdomen lighter; tegmina brown, veins same color as membrane; no granules but some fine black hairs on veins also along apical margin

Habitat. Mount Eeke, West Maui, 5000 feet elevation (*Rock*, August) on *Argyrosciphium* sp. Described from one male. I place this species near *I. incommoda*.

I. mauiensis n. sp. Pl. III, f. 10; Pl. IV, f. 5.

Male. Brachypterous; length 2.2 mm.; tegmen 1.4 mm. Vertex slightly longer than wide, apex bluntly conical, length of face 1.8 times the width in middle, sides slightly arcuate, median carina simple; antennae reaching to base of clypeus, first joint about one-half the length of second (1 to 1.8); hind tibiae longer than tarsi, first tarsus equal to the other two together; tegmina reaching to near base of pygofer.

Clear dull green-yellow, old cabinet specimens being much yellower; eyes, claws, spines on legs, teeth on spur, genital styles, aedeagus and anal spines brown. Tegmina green-yellow, veins same color as membrane, a few minute black hairs iregularly placed mostly alongside the veins.

Pygofer and genital styles as in *I. raillardiae*, the anal spines are not diverging and much nearer together; the aedeagus is long, broad on basal third and subtubular on apical two-thirds, orifice on the ventral aspect of apex, a row of eight broad spines runs along the right side from about the middle to the dorsal aspect of apex, a row of six along the ventral aspect of the apex with two or three small ones on the left side near apex.

Female. Brachypterous; length 2.1 mm.; tegmen 1.4 mm. In coloration similar to male.

Habitat. Wailuku Common, Maui (*Giffard* and *Fullaway*, May 1918) on *Campylotheca mauiensis* and three specimens from *Lipochaeta integrifolia*. Described from sixtyfour males, eighty females and a number of nymphs. This species comes next to *I. incommoda* (Muir) from which it differs chiefly in the shape of the aedeagus.

This was originally described from a single male specimen with a broken aedeagus. I now have one male and five females from near the summit of Haleakala, Maui (*Bridwell*, August 1918) on *Raillardia menziesii* which I consider to be this species. The aedeagus is figured.

I. osborni (Muir). Pl. IV, f. 6.

This was originally described from a single male specimen with a broken aedeagus. I now have one male and five females from near the summit of Haleakala, Maui, (*Bridwell*, August 1918), which I consider to be this species. The aedeagus is figured.

Length of vertex 1.5 times the width, sides subparallel, apex slighly rounded, base about middle of eye; length of face double the width,

sides very slightly curved, median carina simple; antennae reaching slightly beyond base of clypeus, second joint slightly less than twice the length of the face. Tegmina reaching to base of pygofer.

I. neocyrtandrae n. sp. Pl. III, f. 9; Pl. IV, f. 7.

Male. Brachypterous; length 2.7 mm.; tegmen 1.6 mm.; length of vertex equal to width at base, apex slightly narrower, slightly rounded; length of face 2.3 times the width in middle, sides very slightly curved, median carina simple; antennae reaching to middle of clypeus or slightly beyond, second joint 1.3 times the length of first; legs long, first tarsus longer than the other two together; tegmina reaching to the base of seventh segment.

Opening of pygofer large, sub-diamond shape, dorsal edge deeply emarginate for the reception of anal segment which is "lipped" and has two short, thick spines on the ventral surface near together and pointing basad; genital styles large, reaching to anal segment, in full view they are narrow, straight and truncate at apex, in later view broad at the base, concave on the outer edge with a wide subangular projection about one-third from the truncate apex; aedeagus long, narrow and produced to an acute apex, orifice near apex on ventral aspect, a row of seven or eight short spines runs from the apex for about one-third of the length on each side, near to the orifice.

Sepia or bister; carinae of head, antennae, legs, base and middle of dorsum of abdomen lighter clay color; tegmina light clay color with a dark mark at apex of clavus and light fuscous from there to the base of costal cell, veins darker with very minute granules with fine black hairs, the apical margin and the apical veins much lighter.

Female. Brachypterous; length 3.2 mm.; tegmen 1.8 mm. In color on the average lighter than the male.

Habitat. Waikamoi trail, East Maui, 4000 feet elevation (*Rock*, August 1918) on *Gunnera petaloides*. Described from thirty-three males and fifty-six females.

By the genitalia this species comes near to *I. cyrtandrae*, the anal spines are much shorter, the row of spines on the aedeagus not so numerous and do not reach so far basad, the genital styles are narrower and the narrow apical portion much longer. In the series of 89 specimens there is not a great variation in color, a few specimen are slightly lighter than the type, more so among the females. The nymphs have the two median frontal carinae and the first joint of antennae very short, as is usual in this genus; the head, tegminal pads and apical portion of the abdomen are dark, the rest light.

I. mamake n. sp. Pl. IV, f. 8.

Male. Brachypterous; length 2.5 mm.; tegmen 1.8 mm.; vertex as long as broad, apex very slightly rounded; length of face nearly three times the width (1 to 2.8), sides subparallel, median carina simple; antennae reaching to the middle of clypeus, first joint half the length of the second; legs long, hind femora reaching well beyond apex of abdomen, tibia longer than femora, first tarsus longer than the other two together; tegmina reaching to base of pygofer.

The opening of pygofer large, slightly angular at sides, dorsal emargination large enclosing about two-thirds of anal segment; anal segment slightly lipped, two large, slender, slightly curved spines near together at base, directed basad and not visible when anal segment at rest; genital styles large, reaching nearly to anal segment, broad, flat, apex truncate with corners slightly produced, slightly angled at middle; aedeagus long, thin, subtubular, widest at base where it is slightly flattened laterally, slightly enlarged before apex which is pointed, orifice on ventral aspect at apex, three spines on the right side, in a dorso-lateral position near apex, over the ventral aspect and left side on the apical half there are some sixteen small spines, several being bunched together slightly basad of the orifice.

Black; antennae, carinae of head, genae beneath transverse carina, carinae and lateral and posterior edges of pronotum, legs, base and middle of abdominal tergites ochraceous tawny. Tegmina ochraceous, veins black except at extreme base and apex and over cross-veins, the black spreading out into the membrane, the apical margin, apical veins and cross-veins white or light ochraceous, granules very minute, sparse and bearing fine black hairs.

Female. Brachypterous; length 3.8 mm.; tegmen 2.1 mm. Tegmina reaching to eighth tergite. In color the female is lighter than the male, the light color of the carinae extending further afield.

Habitat. Waikamoi gulch, East Maui, 4000 feet elevation (*Rock*, August 1918) on *Pipturus* species (native generic name *Mamake*).

Described from nineteen males and fifteen females. The half grown nymphs have two median carinae and the basal joint of antennae is annular; their color is ochraceous with blackish markings between the carinae of head and thorax, and over the middle of tegminal and wing pads.

This species is quite distinct by the genitalia, it comes into the same group as *I. oahuensis* (Muir).

I. raillardiicola n. sp. Pl. IV, f. 14.

Male. Brachypterous; length 2.4 mm.; tegmen 1.5 mm.; vertex as broad as long, slightly widened at apex where it is slightly rounded, base at middle of eye; length of face 1.9 times the width, median carina simple but broadened and indistinct at the base; antennae reaching slightly beyond base of clypeus, first joint half the length of second; hind femora reaching to the apex of abdomen, femora longer than tarsi, first tarsus equal to the other two together; tegmina reaching to end of abdomen.

Opening of pygofer a little broader than long, dorsal emargination large, embracing half the anal segment; spines on anal segment large, broad at base, diverging; genital styles near to those of *I. tetramalopii* with the angulation on the inner edge more pronounced, aedeagus flattened laterally, apex bluntly pointed, orifice near apex towards the left side, a row of fine spines along the dorsal aspect inclining to the right side, another row of some six spines on ventral aspect with three spines on the right side at the distal end of the ventral row, and two or three small spines on the left at the distal end of the dorsal row.

Head and thorax black or very dark brown, antennae, clypeus and carinae lighter, coxae and abdomen dark, legs, base of abdomen and anal segment lighter. Tegmina hyaline, light ochraceous, a brown mark from apex of clavus over the middle of tegmen to near base of media, another small mark at apex of costal cell, veins concolorous as membrane, no granules but a few very fine black hairs, margins light except at the apex of clavus. The tegmina are slightly raised or humped on the margins of clavus.

Female. Brachypterous; length 2.7 mm.; tegmen 2.0 mm. Tegmina reaching to apex of abdomen. Uniformly ochraceous orange, inclining to brown over the head and thorax.

Habitat. Haleakala, Maui, from 7000 to 8000 feet elevation (*Bridwell*, August 1918) on *Raillardia menziesii* and *Raillardia platyphyllum*. The nymphs are ochraceous orange, brownish over the head and thorax.

Described from seven males, twenty-one females and three nymphs.

There are also five males and six females from the same locality collected by Swezey.

I. painiu n. sp. Pl. IV, f. 16, a, b, c.

Male. Brachypterous; length 2.9 mm.; tegmen 1.8 mm.; length of vertex 1.5 times the width, slightly wider at the apex which is slightly rounded, base slightly behind the middle of eye; length of face twice the width, sides slightly curved, median carina furcate from near apex, the space between the forks raised so that it appears more as a wide carina than as two; antennae extending well beyond base

of clypeus, first joint half the length of second; hind femora not extending beyond the apex of abdomen, tibia slightly longer than tarsi, first tarsus considerably longer than the other two together (1 to 1.4); tegmina reaching to base of seventh segment.

Opening of pygofer large, about as wide as long, dorsal emargination embracing about one-half of the anal segment, anal segment with two long, straight, slender spines far apart at base; genital styles flat, narrow, slightly narrowed in middle, apex truncate; aedeagus slightly flattened laterally, bent in the middle to an angle of about 35 degrees, narrowest at the bend, orifice situated on a latero-dorsal aspect on the right side slightly before apex, a row of small spines on each side from the orifice to near the bend.

Light orange yellow, black between carinae of face, clypeus and genae, brownish on sides of pronotum, between carinae of mesonotum, over coxae, pleura and the lateral portions of abdominal tergites and sternites. Tegmina hyaline, light orange yellow, a dark mark at apex of costal cell and another at apex of clavus with a slight infuscation from the apex of clavus to base of costal cell, veins same color as membrane, no granulations but a few fine black hairs. The second male specimen has a darker head, the basal joint of the antennae as well as vertex and carinae of face being all dark.

Female. Brachypterous; length 3 mm.; tegmen 1.8 mm. In color much lighter than the male, being nearly uniformly light orange yellow, infuscate over head and basal joint of antennae.

Habitat. Ridge south of Iao Valley, Maui (*Bridwell*, September 1918) on *Astelia veratroides* (native name painiu). Described from two males and two females. This species is near to *I. nesogunnerae* (Muir).

I. coprosmicola n. sp. Pl. IV, f. 18.

Male, brachypterous. Width of vertex at base equal to length, apex slightly narrower than base, slightly rounded; length of face twice the width, narrowest between eyes, median carina forked at extreme base; antennae reaching to near middle of clypeus, second joint twice the length of first; tegmina reaching to base of pygofer; first hind tarsus slightly longer than the other two together.

Dark brown or black; carinae of head, antennae, rostrum, legs, base of abdomen and anal segment yellowish or light brown. Tegmina hyaline, a dark brown mark at apex of clavus broadening out into a light fuscous band across tegmen from apex of costal cell to near base, being much fainter over the basal portion of costal cell, veins same color as membrane, granules very minute with black hairs.

Opening of pygofer deeper than broad, margins entire, dorsal emargination deep with anal segment sunk into the emargination, anal spines large, curved basad, wide apart; genital styles large somewhat like those of *blackburni* but with the apex more oblique; aedea

gus figured from right side, no spines on left side except along ventral aspect and a bunch of smaller ones near apex.

Length 2.2 mm.; tegmen 1.5 mm.

Female, brachypterous. Similar in color to the male.

Length 2.9 mm.; tegmen 1.8 mm.

Habitat. Olaa, 27 miles, Hawaii (*W. M. Giffard*, August 1918) on *Coprosma ernodioides*. Described from nine males and ten females and some nymphs which are dark brown with some lighter markings. There is but little variation in color in the type series.

I. ulehihi n. sp. Pl. IV, f. 12.

Male, brachypterous. Length of vertex slightly greater than the width, apex slightly rounded, base at middle of eye; length of face 3.3 times the width, narrowest between eyes; antennae reaching well past the middle of clypeus; first joint shorter than the second (1 to 1.4); legs long, first hind tarsus longer than the other two together; tegmen reaching base of eighth segment.

Vertex, thorax and abdomen black, face light brown with the carinae and a thin longitudinal line between carinae brown, antennae, rostrum and legs brown, metathorax and base of abdomen salmon color. Tegmina hyaline, light brown, a black mark at apex of costal cell, another and larger one at apex of clavus which continues as a lighter mark diagonally to near the base of subcosta, veins at base and apex light brown, in middle fuscous, granules minute with black hairs.

Explanation of Plate III.

Fig. 1 *Ilburnia waikamoiensis*, pygofer full view.

Fig. 2 *Ilburnia coprosmae*, pygofer full view.

Fig. 3 *Ilburnia bridwelli*, pygofer full view.

Fig. 4 *Ilburnia longipes*, pygofer full view.

Fig. 5 *Ilburnia stenogynicola*, pygofer full view.

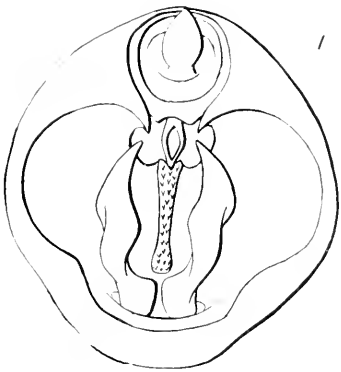
Fig. 6 *Ilburnia pulla*, pygofer full view.

Fig. 7 *Ilburnia tetramalopii*, pygofer full view.

Fig. 8 *Ilburnia waikamoiensis*, aedeagus, right side.

Fig. 9 *Ilburnia neocyrtandrae*, genital style.

Fig. 10 *Ilburnia mauiensis*, genital style.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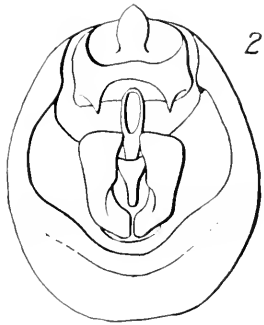
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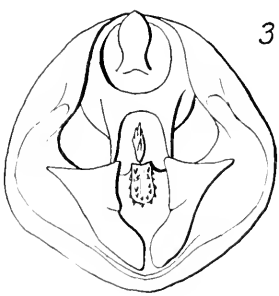
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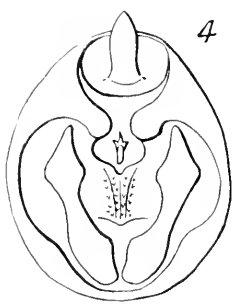
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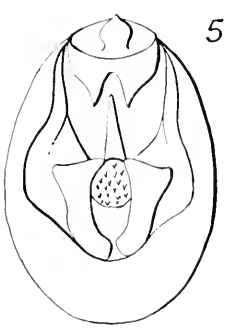
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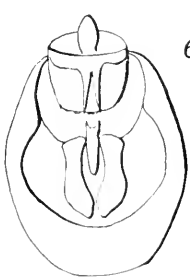
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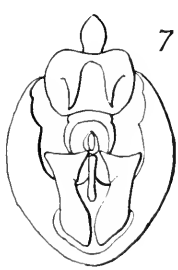
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Plate IV.

Fig. 1 *Ilburnia curvata*, aedeagus, right side

Fig. 2 *Kelisia cragrosticola*, aedeagus, right side.

Fig. 3 *Ilburnia curvata*, right genital style.

Fig. 4 *Ilburnia kokolau* (a.) aedeagus, right side; (b.) right genital style.

Fig. 5 *Ilburnia maniensis*, aedeagus, right side.

Fig. 6 *Ilburnia osborni*, aedeagus, left side.

Fig. 7 *Ilburnia neocyrtandrae*, aedeagus, left side.

Fig. 8 *Ilburnia mamake*, aedeagus, right side.

Fig. 9 *Ilburnia acula*, right genital style.

Fig. 10 *Ilburnia monticola*, aedeagus, right side.

Fig. 11 *Ilburnia acuta*, aedeagus, right side.

Fig. 12 *Ilburnia ulehihi*, aedeagus, right side.

Fig. 13 *Kelisia sporobolicola*, aedeagus, right side.

Fig. 14 *Ilburnia raillardiicola*, aedeagus, left side.

Fig. 15 *Ilburnia longipes*, aedeagus, right side.

Fig. 16 *Ilburnia painiu* (a) aedeagus, end view; (b) right side view; (c) genital style.

Fig. 17 *Ilburnia pulla*, aedeagus, right side.

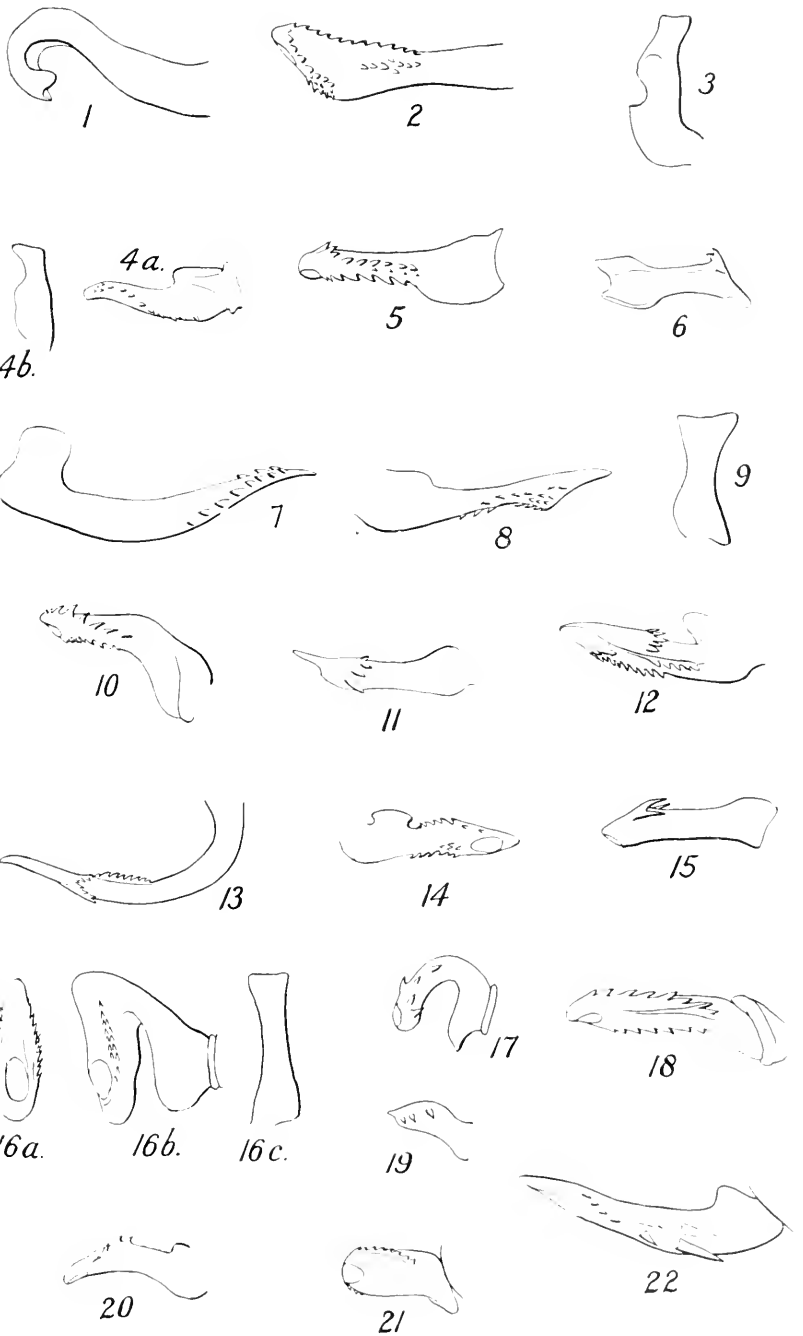
Fig. 18 *Ilburnia coprosmicola*, aedeagus, right side.

Fig. 19 *Ilburnia tetramalopii*, aedeagus, right side.

Fig. 20 *Ilburnia bridwelli*, aedeagus, right side.

Fig. 21 *Ilburnia coprosmae*, aedeagus, right side.

Fig. 22 *Ilburnia stenogynicola*, aedeagus, right side.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Opening of pygofer about as broad as long, dorsal emargination large, anal segment sunk well into emargination but not surrounded, anal spines not visible from external view, but are large, touching at base and slightly diverging; genital styles somewhat similar to those of *I. bridwelli*, the projection in the middle of the inner margin more prominent, and a projection on inner edge at base; aedeagus figured from right side, the dorso-median row of spines on the right side continues distad on the left near the dorsal line, otherwise there are no spines on the left side.

Length 3.6 mm.; tegmen 2.2 mm.

Female, brachypterous. In color similar to male.

Length 4.5 mm.; tegmen 2.8 mm.

Habitat. Olaa, 27 miles, Hawaii (*W. M. Giffard*, June 1918) on *Smilax sandwicensis*, the native name of which is Ulehihi. Described from three males and three females.

I. blackburni (Muir.)

Three males and four females from Waikamoi gulch, East Maui, 4000 feet elevation (*Rock*, August 1918) on *Cyanea hammatifolia*. In color these specimens are similar to some of the specimens from Hawaii, the males having a black or very dark pronotum and mesonotum. The small comb of teeth on the ventral sides of the median orifice is more definite than in the Hawaii specimens.

I. wailupensis (Muir.)

Aloha wailupensis Muir. Proc. Haw. Ent. Soc. III, p. 181 (1916).

The median facial carinae join together near the apex. This should be placed in *Ilburnia* and not *Aloha*. This necessitates giving a new name to *Nesosydne wailupensis* Muir, for which I propose *Ilburnia neowailupensis*, new name.

I. lobeliae (Muir.)

One male and two females on *Kadua glomerata* from Mount Olympus, Oahu (*Timberlake*, September 1918). The large, flat spine on the anal tube has two small spines near the apex the type having but one.

Miscellaneous Notes on Hymenoptera.

With Descriptions of New Genera and Species.

BY JOHN COLBURN BRIDWELL.

1. Hymenopterous Larvae with Falcate Mandibles.

Mr. C. E. Pemberton in his recent work on the life-histories of the fruit fly parasites has found that the Opiine Braconids and the Diapriid *Galesus Silvestrii* have the first larval stage provided with long falcate mandibles which are used to destroy other larvae in the same host. He has also in unpublished studies on the life-history of the parasite of the Lantana Agromyzid described in another paper in this issue as *Opius lantanae* found the same type of first stage larva. Oglobin found the same type of larva in the Coccinellid Braconid *Dinocampus terminatus* (Nees). I have found the same type in the Bruchid parasite *Heterospilus prosopidis* Crawford and Graenicher has found a similar larva in some of the parasitic bees.

On the other hand Pemberton and Willard in studies of the external parasite of lepidopterous larvae here described as *Microbracon Pembertoni* have found an entirely different type of first instar larva. The first stage larva of *Aphycus*, *Perilampus*, *Tetrastichus*, *Scutellista*, and many other Chalcidoid parasites are very different.

What then is the significance of the falcate mandibles? Are they phylogenetic in significance or adaptive? The latter seems to be the case and we may perhaps safely generalize in this way. Cetain species of parasitic Hymenoptera where the prey or host is concealed and successive parasitization is probable have independently developed the long falcate mandibles which give a means for one larva to destroy the other. At any rate in the cases studied one larva alone reaches maturity and in the case of some at least in which the mandibles are not so developed more than one parasite can reach maturity upon a single host.

Proc. Haw. Ent. Soc., IV, No. 1, June, 1919.

2. Notes on Some Species of Echthromorpha in the Collection of the Hawaiian Sugar Planters' Association.

Echthromorpha maxima Krieger.

1 ♀ Piroe, Ceram. (F. Muir.)

Length 27 mm.; antennae 22 mm.; wing 23 mm.; ovipositor 14 mm.; about as long as the abdomen.

In the long ovipositor, short face and malar space and the somewhat humped first tergite, this species approaches the genus *Glyptogastra* Ashmead.

Echthromorpha notulatoria (Fabricius)

1 ♂ Loo Fou Chan, China. (F. Muir.)

Echthromorpha insidiator (Smith).

1 ♀ Amboina. (F. Muir.)

Echthromorpha immaculata Krieger 1908.

Echthromorpha diversor Morley 1913.

1 ♀ 4 ♂ Rewa, Viti Levu, Fiji Islands. (F. Muir.)

The ♀ has not been previously described.

Length 13 mm.; wing 11 mm.; abdomen 8 mm.; ovipositor 4 mm.

Antennae 32 jointed, about as long as the body, fourth joint not quite as long as the fifth and sixth together, remaining joints successively shorter to the penultimate, which is a little longer than broad, ultimate joint a little longer. Head yellow, somewhat suffused with reddish, eyes dark, front and occiput blackish, scape yellow, antennae reddish. Head somewhat shining with a few uneven and irregular shallow punctures

Prothorax and mesonotum largely reddish, varied with yellow, a broad longitudinal median band on the mesonotum suffused with black, mesopleura and mesosternum, sides of propodeum and a suffused median longitudinal band on its declivity black; elevation beneath the wings, disc of scutellum and metanotum, suffused area on either side the apex of the propodeum yellow with more or less reddish surrounding. Mesonotum dullish with shallow oblique punctures more or less disposed in median and parapsidal groups, mesopleurae above smooth and shining, below and

in front somewhat coarsely punctured on a shining ground, propodeum somewhat punctured and transversely striate above the stigmata.

Abdomen with tergites 2-4 black, remainder reddish, a yellow spot on either side the apex of the first tergite; tergum smooth and highly polished with some scattered punctures, somewhat more punctate laterally.

Legs yellowish, hind and middle tibiae more or less reddish. Wings yellowish hyaline, the nervures brown.

Mr. Timberlake who has checked over the description of *E. immaculata* and *E. diversor* agrees in synonymizing Morley's species.

Echthromorpha fuscator (Fabricius).

While on the subject of *Echthromorpha* it may be noted that after diligent efforts to find females corresponding to the ♂ described by Cameron as *flavo-orbitalis* I have never taken or seen a female with yellow orbits. Males with the characters of *flavo-orbitalis* Cameron are not uncommon among the smaller individuals. I am convinced that *flavo-orbitalis* is only a weak color variety of *fuscator* (*maculipennis* Holmgren) connected by intermediates with the larger normal form. The species is abundant at all elevations in the Hawaiian Islands, attacking numerous species of endemic and immigrant lepidoptera.

3. Glyptogastra Ashmead.

It is curious that *Echthromorpha fuscator* (Fabr.) should be so common and adaptable to various endemic and immigrant hosts while its allies in *Glyptogastra* remain rare.

Glyptogastra Ashmeadi Perkins.

Has only been taken in the Koolau Range of Oahu at elevations of 1500-1800 feet and always singly. Probably not more than a dozen specimens at the outside have ever been taken but they may be more common than seems for in flight they very much resemble the omnipresent *Echthromorpha*.

The ♀ has never been described. It resembles the ♂. The mouth parts, edge of clypeus antennae, legs from the trochanters on suffused edges of the tergites and two or three ultimate tergites reddish, rest of body bronze, wings dusky hyaline.

Length 11 mm.; wings 9 mm.; abdomen 7 mm.; ovipositor 4 mm. Antennae about as long as the body.

Glyptogastra hawaiiensis Ashmead.

A single ♂ specimen of *Glyptogastra* taken on the foliage of *Acacia koa* at Olinda, Maui, was at first supposed to represent a new species but having only ♀ of *Glyptogastra hawaiiensis* Ashmead for comparison the question remained unsettled. Another specimen in the Bishop museum from Maui is somewhat intermediate in the supposed differentiating characters. I believe the species has not previously been reported as occurring on Maui.

Since writing the note above the examination of three ♂ *Glyptogastra hawaiiensis* taken by Mr. W. M. Giffard, one from Iao Valley, Maui, March 6, 1909, and two from Kilauea, Hawaii, 1911 and 1912, make the reference of the Maui specimens to this species certain. The single ♀ known to be in the collections in the Islands is in the collection of the Hawaiian Sugar Planters' Association and was taken by the late F. W. Terry in the koa forest at Kilauea, Hawaii, June 3, 1905.

The more metallic coloration of *Ashmeadi* with the reddish bands of the abdomen make it easily distinguishable from *hawaiiensis*.

4. Amblyteles Koebelei (Swezey).

I had always supposed that *Ichneumons* parasitized the pupae of lepidoptera but an observation made June 16, 1918, upon this species showed a different procedure. While coming down near the base of one of the ridges of the Waianae Mountains above Waipahu, Oahu, at about 3 p. m. a large, full-fed cutworm was observed in violent contortions on the ground. Upon examination it was found that it was being attacked by a large ichneumon which was stinging it in various places. It

was so intent upon this that it permitted me to pick it up by the wings and it held its grip so strongly that the cutworm was lifted with it. Both were placed in a tube and this plugged with cotton but unfortunately both ichneumon and cutworm escaped through the cotton plug which had been made too loose to retain them.

Mr. Swezey informs me that this must be the normal method of attack for this species since the cutworms from the pupae of which it has been bred are usually subterranean. The cutworms emerge from shelter in the late afternoon preparatory to feeding and it is at this time which the *Amblyteles* has been observed most active on the wing.

Mr. Timberlake, who has examined this species, places it in *Amblyteles*. It was described as an *Ichneumon*.

BRACONIDAE.

5. Hawaiian Vipionine (formerly Braconine) Braconidae.

1. Second abscissa of radius shorter than the 1st transverse cubitus, propodeum and abdomen neither entirely smooth nor distinctly sculptured, being microscopically shagreened, coloration exceedingly variable, sometimes entirely reddish yellow, except the eyes and antennae, thorax and abdomen usually largely black; ♀ antennae 14-15 jointed, rather short and stout, ovipositor shorter than abdomen; a common parasite of *Ephestia elutella*, etc. .... *Habrobracon hebetor* (Say)

Second abscissa of radius longer than the 1st transverse cubitus, ♀ antennae more than 14 jointed, slender 2

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*I have seen a single specimen, possibly another species, in which the antennae are 12 jointed, the thorax and abdomen black and there are black markings on the head.

2. Head, thorax, and abdomen highly polished and shining, black, abdomen and legs in part yellowish, ovipositor about as long as head, thorax and abdomen together, a parasite of *Tephritis* in *Bidens* ....*Microbracon Terryi* Bridwell

Head and thorax not entirely black, ovipositor elongate in only one predominently red species..... 3

3. Predominently red, thorax highly polished and shining, abdomen rugulose, ovipositor about as long as abdomen and thorax.....*Microbracon Pembertoni* n. sp.

Ovipositor not longer than abdomen; if predominently reddish, the propodeum rugulose 4

4. Thorax black except the parapsidal marks, these with radiating silvery hairs on their margins; abdomen smooth with copious silvery hairs..... .... *Microbracon omiodivorum* (Terry)

Head, thorax and abdomen predominently reddish yellow, abdomen rugulose with only a few feeble hairs ..... *Microbracon Swezeyi* n. sp

All the species are immigrants into the Hawaiian Islands.

Microbracon Terryi Bridwell.

Described in a subsequent paper in this number.

Microbracon omiodivorum (Terry).

Macrodyctium omiodivorum Terry.

Expt. Sta. Hawn. Sugar Planters' Assoc. Div. Ent. Bull. 5:37 ♀ ♂ Hawaii 1907.

Bracon omiodivorum Perkins.

Fauna Hawaiiensis 1:cxi. 1913.

The material studied by Terry is present in the collection of the Hawaiian Sugar Planters' Association. It consists of 14 ♀♀ and 14 ♂♂ taken from 1905 to 1907 and includes individuals from Hawaii, Maui, Oahu and Kauai. These have

been labelled as *Cotypes*. There are also in this collection two individuals taken by Mr. Terry at Hong Kong. Mr. Swezey has published the opinion that this species was introduced into the Islands from Japan by Mr. Koebele and has recorded it as breeding upon *Nacoleia accepta* (Butler), *N. Blackburni* (Butler), *Hymenia recurvalis* (Fabricius) and *Archips postvittanus* (Walker), all leaf rolling Lepidoptera.

Microbracon Pembertoni n. sp.

Bracon sp. Swezey. Proc. Haw. Ent. Soc. 3:109. (Last entry so headed). 1915.

♀. Red; tips of mandibles, palpi more or less, antennae, eyes, ocelli, propodeum more or less (often only very slightly, at the insertion of the abdomen), ovipositor sheaths, tarsi and apex of hind femora more or less, black or blackish. Wings fuscous subhyaline, nervures the same except that the costa basally is reddish and the stigma is yellow.

Head and thorax highly polished and shining; the tergites rugulose, the connate second and third tergites more coarsely so. Suture of the second and third tergites crenulate; suture between the third and fourth (free) tergites smooth, a sulcus there but indefinite behind.

Antennae about 40-jointed, about as long as the body, ovipositor about three-fourths as long as the head, thorax, and abdomen together.

Length about 4 mm.; wings 5 mm.; ovipositor 3 mm.

♂. Similar to the female but smaller.

Described from 24 ♀♀ and 22 ♂♂ collected or bred on the island of Oahu, the earliest record being in April, 1914.

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society, paratypes in the U. S. National Museum, in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

It has been bred from berries of *Lantana camara*, probably from the larva of *Crocidosema lantanae* by O. H. Swezey and J. C. Bridwell, from *Pectinophora gossypiella* by D. T. Fullaway, C. E. Pemberton, and H. F. Willard, and from *Myelois ceratoniae* and *Cryptophlebia illepida* the former in pods of *Acacia farnesiana*, the latter in the same and in the pods of *Acacia koa* (J. C. Bridwell).

The species is named for C. E. Pemberton, whose studies of the biology of the parasites of fruitflies have been of unusual interest. He began studies of the life history of this species which have been continued by H. F. Willard. To Mr. Willard I am indebted for a series of specimens of this species bred from *Pectinophora gossypiella* in the course of his studies upon the species.

Since writing the description above Mr. Willard has shown me specimens used in refrigerator experiments in which the mesosternum is largely black.

Microbracon Swezeyi, n. sp.

Bracon sp. and *Bracon* sp.? Swezey. Proc. Haw. Ent. Soc. 3:109. 1915.

♀. Yellow, tips of mandibles, edges, ocelli, antennae, ovipositor sheaths, ungues and apex of last tarsal joint black or blackish, head more or less piceous, propodeum and 1st and 2nd tergites suffused with fuscous sometimes pale, wings grayish hyaline, the nervures colorless, very translucent, the second transverse cubital nervure obsolescent.

Head and thorax highly polished, smooth and shining; propodeum reticulorugose, the spaces round but hardly punctiform, a crenulate line down its middle; abdomen rugulose, tergites 1-3 longitudinally, the following transversely and more finely rugulose; furrow between the first and second tergites smooth narrowly interrupted in the middle; furrow between the connate second and third tergites crenulate, tergites 4, 5 and 6 contracted at base, hardly furrowed.

Antennae about 36-jointed, not as long as the head, thorax and abdomen together; ovipositor short, not more than half the length of the abdomen.

Length 3.5 mm.; wing 3 mm.; ovipositor .75 mm. These are the measurements of the type. The other ♀ ♀ are considerably smaller.

♂ Similar, the abdomen very slender.

Described from 1 ♀ (the type) bred by O. H. Swezey from *Bactra straminea* (Butler), Jan. 7, 1913, 4 ♀ and 2 ♂ bred from *Batrachedra curiculator* Busck May 4, 1914, Lepidoptera whose larvae feed in the brackish-marsh sedges in the Kewalo district of Honolulu. I have also 1 ♀ taken at Waikiki in 1917, and 6 ♀ and 2 ♂ taken in the marshes there May 30, 1919 (Bridwell).

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society, paratypes in the collection of the Hawaiian Sugar Planters' Association, in the U. S. National Museum, and in the author's collection.

Named for Mr. Swezey, who first bred this little species, as he has so many of the immigrant parasites.

ALIENIDAE.

6. A Peculiar Wingless Hymenopteron Forming the Type of a New Genus and Family.

The apterous insect described below is so peculiar that it will not fall into any of the families at present recognized, and rather than alter the limits of some recognizable family to include this highly anomalous form it has seemed better to erect for it a family of its own Alienidae. Even so it remains doubtful in what superfamily this genus should find place.

Alienus n. gen.

Head slightly broader than the thorax and abdomen, quadrate in the dorsal aspect, declivous in front and prolonged into a short snout in front of the large oval facetted eyes which occupy the greater part of the sides of the head. Face concave for the insertion of the antennae and coarsely obliquely striate. Antennae inserted just in front of the mouth near the mandibles which are small nearly straight and conical without teeth, malar space longer than broad; mouth cavity small, triangular, margined, anterior to the eyes, no evident gular cavity or suture, ocelli moderate, arranged in an acute triangle, the posterior pair adjacent to the inner orbits and considerably more than their distance apart before the occipital margin, occiput finely margined. Antennae filiform, 13-jointed, strongly geniculate, scape subcylindrical elongate, a little thicker toward the base, flattened on the side next the flagellum, about as long as the pedicel and first three flagellar joints not quite attaining the level of the anterior ocellus, pedicel elongate, half as long as the first flagellar joint, second and following joints successively shorter, the last five each about as long as broad, the last joint about as long as broad and narrower and rounded at apex.

Pronotum loosely articulated with the mesonotum, quadrate, massive, truncate in front and slightly arcuately emarginate behind with

the lateral angles a little prolonged, a little narrower than the mesonotum and about as long as the mesonotum and scutellum together; propleura and prosternum loosely articulated with the pronotum; prosternum small, transverse, bounded laterally and in front by the propleura which meet broadly below, above they are separated by a small free cervical sclerite.

Mesonotum slightly convex transversely, transverse slightly arcuate behind, laterally finely margined, scutellum transverse a little narrower and shorter than the mesonotum and separated from it by a straight simple furrow which does not attain the lateral margins, impressed obliquely at either side at the end of this furrow.

Propodeum quadrate, narrower than the pronotum, slightly transversely convex in the same plane with the mesonotum, separated from it by a shallow furrow, bounded posteriorly by a fine line similar to the transverse striations of its surface, the declivity transversely rounded but exactly vertical as seen from the side.

Mesopleura convex depressed beneath the ridge formed by the projecting margin of the mesonotum, a curved foveolate furrow leading up to the posterior margin of the mesonotum from the round pit just above the middle coxae, sides of propodeum concave.

Legs rather slender, not at all spinose, all the coxae contiguous, the femora slightly thickened, the anterior and posterior more so than the middle femora, hind trochanters two jointed; front and middle femora about as long as their tibiae, the hind tibiae longer than their femora; calcaria feeble 1, 2, 1, calcaria of the middle legs unequal, hind calcaria curved, basitarsi slender elongate, a little shorter than their tibiae and about as long as joints 2-5 of the tarsi, all the joints sub-cylindrical, ungues small.

Abdomen oval, slightly broader than the mesonotum, convex above and beneath with four visible tergites and sternites; tergites 1 and 2 subequal, occupying the greater part of the tergum, sternite 1 emarginate behind much smaller than 2 which occupies the greater portion of the venter, other sternites and tergites transverse, the tergites and sternites are simple, without depressed margins or other special structures except that tergite 1 has a feeble imperfect elevated line at the edge of the declivity. Type *Alienus aenigmaticus* Bridwell.

Alienus aenigmaticus n. sp.

Sex, indeterminate.

Black, the vertex and face with dark bronzy greenish metallic reflections, pedicel and 1st and 2nd flagellar joints and legs, from the coxae on, yellowish testaceous.

Concavity of face shining, coarsely transversely striate with the ends of the striae directed downward, above these some striae parallel to the orbits, vertex smooth and shining finely and sparsely punctate, a shallow depressed space on the vertex behind the ocelli; pronotum with

shallow scattered punctures the integument between microscopically lineolate, shining, mesonotum and scutellum much the same, propodeum finely transversely striatorugulose with a smooth posterior narrow band separating the upper face from the somewhat more distinct transverse striae of the declivity; mesopleura shining with rather coarse scattered punctures, sides of propodeum smooth and shining with some longitudinal striae on the lower part of the concavity. Hind coxae outwardly transversely striate.

Abdomen minutely transversely lineolate with feebly indicated shallow scattered punctures.

Length 3.3 mm.; width of head .8 mm.

One individual found running on the ground, Mowbray Golf Links, Capetown, South Africa, April, 1915 (J. C. Bridwell).

Type in the author's collection.

Affinities. The form of the head and insertion of the antennae on the extreme anterior margin of the head seem to show affinity with the Ceraphronidae but the form of the prothorax and the 13 jointed antennae seem to forbid association with them. The form of the head and mandibles, the long scape and pedicel, the slender legs and four segmented abdomen forbid association with the Bethylidae, Embolemidae and Dryinidae, the short hind coxae forbid association with the Psammocharidae. The absence of a basal constriction of the abdomen and many other characters forbid association with other families of the Scolioidea. On the whole, this insect would seem to fall in the Serphoidea but for the present it seems better to consider it as the monotypic representative of a family Alienidae rather than to modify any of the existing families for its reception.

TIPHIIDAE.

7. Epimodiopteron Romand.

Scoliphia Banks Can. Ent. 44:201. 1912

Epimodiopteron spilota (Banks). Arizona.

I have seen specimens of this species from the Stanford University collection collected by W. M. Mann in Arizona

through the kindness of Prof. Vernon Kellogg. I can find no important differences between Banks' genus and *Epimodiopteron*.

8. Paratiphia.

It seems very doubtful if this genus can be maintained since extra-American species are found which present singly two of the three characters by which the genus is separated from *Tiphia*. The first abdominal segment may be carinate without the white clypeus of the ♂, while the venation is normal for *Tiphia*, or the venation may be like *Paratiphia* and the other characters like *Tiphia*.

EUMENIDAE.

9. What Is Abispa australiana Mitchell?

The late Mr. Meade Waldo (Ann. Mag. Nat. Hist. (8) 14:461, 1914) synonymized Mitchell's genus *Abispa* with *Polistes*, reviving Saussure's *Monerobia* for this interesting genus of Australian Eumenidae. That this course should not be followed was my conclusion after examination of Mitchell's work, and the two Hymenoptera involved in the question.

Mitchell's Journals of 1831-2 were prepared for publication in 1838, seven years after Mr. Mitchell and his friend were stung by the ferocious *Polistes tepidus*. It is evident that the description was drawn up at the latter date and from this description it is easy to see that the great explorer was far from being familiar with entomological terms. If one compares the description of the insect which he gives with *Polistes tepidus* and Smith's *Abispa australis* it seems perfectly clear that, in the seven years intervening between his expedition and the publication of his Journals that he had become confused as to the identity of his assailant and described the largest and most ferocious-looking of the wasps he had collected under the influence of this confusion.

Since the original description is not readily accessible to entomologists its reproduction is desirable. It is found as a

footnote on page 104 of volume one of his Three Expeditions into the Interior of Eastern Australia and reads as follows: Genus, VESPA; subgenus, ABISPA; species *Abispa Australiana* (mihi).

Head, antennae, and feet yellow; eyes black; the scutellum of prothorax yellow; the scutum of mesothorax black; with the scutellum yellow; the scutum of the metathorax yellow, with the scutellum black and the axillae yellow. The wings yellow, with dusky tips. The first segment of abdomen has the petiole black. The second segment is black and the rest yellow.

It is clear that the interpreting "the scutellum of the prothorax" as the pronotum, "scutum of metathorax" as the metanotum, "scutellum" of the same as the superior face of the propodeum, and the "axillae" as the posterior lateral angles of the propodeum and allowing a little inaccuracy in the statement that the second abdominal segment is black, we have a reasonably close description of *Abispa australis* Smith.

It is especially to be noted that Mitchell does not use the name in the text.

It seems clear that the stinging insect mentioned in the text is *Polistes lepidus* (Fabricius), but it seems equally clear that the insect described in the footnote is *Abispa australis* Smith and that accordingly we must retain the name *Abispa* for the genus of Australian Eumenid wasps in preference to Saussure's *Monerobia*.

In Della Torre's Catalogue an error has crept in in citing *Abispa ephippium* Mitchell. There is no such combination to be found in the work indicated. Smith has given the same erroneous reference. Both are doubtless based on Saussure's supposition that *australiana* is identical with *ephippium*. There is, however, no reason to suppose this is the case.

The synonymy then may read:

Abispa Mitchell 1838.

=(*Monerobia* Saussure) 1852.

=(*Polistes* Meade Waldo) 1914 nec Latreille.

Type *Vespa* (*Abispa*) *australiana* Mitchell 1838. Monobasic.

Abispa australiana Mitchell 1838.

=(*Abispa australis* Smith).

Cat. Hym. Brit. Mus. 5:42. 1857.

These notes were based upon material kindly placed at my disposal for study in the Queensland Museum in 1915.

10. Nesodynerus Rudolphi (Dalla Torre).

On one of the outer ridges of the Waianae Mountains at an elevation of about a thousand feet are some exposed boulders. On a protected side of one of these, beneath which a projection made a suitable place for them were found on June 15, 1918, some mud nests of *Sceliphron cementarius*, some of the cells having in them pupae or tenerous adults. From others they had emerged and these were being utilized by *Odyneri* for their nesting places. One female *Nesodynerus Rudolphi* was taken within one of the cells, while others contained lepidopterous larvae brought there by the wasps. Two contained *Odynerus* larvae, one full fed and in the other were caterpillars as well. One contained a single egg, elliptical in outline about twice as long as broad and suspended by a thread not quite as long as the egg itself. These were brought in for study.

The caterpillars used for larval food were all those of *Amorbia emigratella* Busck which I found later feeding beneath a web on the flower shoots of *Dracaena*. The number employed could not well be made out on account of the breakage of the cells when they were removed from the rock, probably six or eight, however, were required for a single cell. Each cell of the *Sceliphron* was divided by an earthen partition and served for two cells of the *Odynerus*.

The larva which was still feeding, during the day and night since being brought in, had eaten all it cared for of two caterpillars. It sinks its head into the body of the caterpillars in front of the prolegs and feeds voraciously like a caterpillar upon the substance of the caterpillar within the skin, its mandibles being in constant motion. Two of these larvae were completely devoured and the third was half eaten.

The caterpillars were all in a living condition and moved slightly at their extremities when disturbed, but were incapable of locomotion.

The egg was found at about two o'clock June 15, 1918, and hatched June 18, but the larva died without feeding.

11. Odynerus pseudochromus Perkins.

The nests of this species are made in the pith cavities of dead twigs and branches, the cells being separated by weak mud partitions. Usually from one to three cells are to be found in a place. One nest found on Mt. Lamihuli was stored with the larvae of the Ohia Tortricid (*Eccoptocera faeleirorans* Butler). There were about a dozen of the larvae in one cell. The egg was near the bottom of the mass of larvae and was attached by a thread shorter than the egg.

TRYPOXYLONIDAE.

12. Pison in the Hawaiian Islands.

The following table will serve to distinguish the three species of *Pison* which are now known to be established in the Hawaiian Islands:

1. First and second recurrent nervures interstitial with the 1st and 2nd transverse cubital nervures..... ..... *iridipennis* Smith
   Second recurrent received by the second cubital cell..... 2
2. First recurrent interstitial with 1st transverse cubitus calcaria of hind tibiae pale. .... *argentatum* Smith
   First recurrent received by the first cubital cell. Calcaria of hind tibiae dark..... *hospes* Perkins

HYLAEIDAE.

13. Some Segregates from Hylaeus.

The processes of type-fixation now under way involve a number of changes in nomenclature which are not greatly welcomed by many of us whose tendencies are conservative and in many cases type fixation results in obvious violation of the

wishes of the author of the genus. This has been the result particularly with the work of Fabricius where his carelessness in the inclusion of extraneous forms has resulted in such extraneous forms being made types of his genera. Such a case is that of *Prosopis* and *Hylaeus*. The type fixation here has not been recent but it has been disregarded until recently and the change of names so forced upon us is far from pleasant. But it seems to me that instead of grieving over our wounds and delaying the acceptance of necessary changes we should hasten the process of type fixation and be done with the whole unpleasant business. Recent investigations on my part of the status of several of the older names in the bees has thoroughly convinced me that no possible stability in nomenclature can be secured without a thoroughgoing acceptance of the principle of a single type for every genus and family. Such researches are entirely out of the reach of most of us who have not free and continuous access to the larger entomological libraries, and it is to be hoped that those who have such opportunity will hasten the completion of this work. More than this, it seems to me that the next revision of our nomenclatorial code should further clarify our rules regarding type fixation and an important addition made which would refuse to recognize any subsequently formed genera for which no type is established upon publication.

Hylaeus Fabricius, whatever the original intention of the author, (as has been recently called to our attention by Morice and Durrant) was fixed as the proper name for the bees which all more recent authors have called *Prosopis* when Latreille in 1802 fixed *Apis annulata* Linne as its type. Whether we accept the Elangen list or not, the type of *Prosopis* "Jurine" of that list (1801) is congeneric with the type of *Hylaeus* and that of *Prosopis* Fabricius (1804) is identical with that of *Hylaeus*. There is no escape then from sinking *Prosopis* and reviving *Hylaeus* even if Fabricius, as nearly as he ever came to recognizing genera, wished to make *Hylaeus*=*Halictus* and to give the name *Prosopis* to the bees so long known under that name.

However, before we transfer *en masse* the heterogeneous species described under *Prosopis* to *Hylaeus* it will be well to segregate some of the species into proper genera.

The following table will serve to distinguish some genera, described species of most of which have been placed in *Prosopis*. This work of segregation is far from complete. Certainly most of the Australian species described as *Prosopis* will not fall in any properly defined genus *Hylaeus*. Neither material at hand nor time permits an investigation of all the genera which should fall into the *Hylaeidae*.

TABLE OF SOME GENERA OF HYLAEIDAE.

1. Mandibles flattened at apex or tridentate or bidentate in both sexes 2

Mandibles acute at apex, edentate, elongate, nearly straight, propodeum rugose, angulate at the sides and subcarinate, the triangular basal area well defined with its sculpture different from the rest of the propodeum, first recurrent nervure received by the first cubital cell or interstitial, the second interstitial with the second transverse cubitus or received *beyond* it, supraclypeal area short, bounded by lateral carinae. Face broad, usually broader than long, clypeus trapezoidal, about as high as broad at its anterior margin, labrum triangular.

♂ Stipes greatly produced apically into a slender process nearly as far beyond the apices of the sagittae as their length, eighth sternite with a short rounded median process.

Coloration. Thorax black, frequently with yellow and ferruginous markings, legs and first segment of the abdomen usually more or less ferruginous .....*Nothylaeus* n. gen.

2. Mandibles bidentate at apex 4

Mandibles tridentate at apex .....
..... certain Australian "*Prosopis*"

Mandibles flattened at apex, not toothed..... 3

3. Mandibles not channelled, truncate at the apex, supraclypeal area not angulate between the bases of the

antennae (evenly rounded down to the sockets). .....
..... *Gnathoprosopis* Perkins

Mandibles channelled outwardly as in *Hylaeus*, rounded at apex, sides of supraclypeal area ridged or angulate between the antennae ..... *Gnathylaeus* n. gen.

4. Scutellum and metanotum normal.....*Hylaeus*, etc.

Scutellum and metanotum produced posteriorly on either side into a lateral laminate tooth or spine, superior face of propodeum areolate, separated from the posterior face by a carina, posterior face divided by a longitudinal carina, angulate and subcarinate at the sides, supraclypeal area narrowed above margined, clypens higher than broad at apex, first and second cubital cells receiving the recurrent nervures near their apices.

♂ Apical narrow portion of stipes with black hairs, but little longer than the basal part, slightly exceeding the sagittae, eighth sternite produced into a rounded lamina as long as wide as its base, carinate medially.

Coloration black with yellow markings on the collar and in the ♂ upon the head and legs.....*Metylaeus* n. gen.

14. Nothylaeus, n. gen.

This genus so far is Ethiopian in its distribution. Several species previously described as species of *Prosopis* are referable here and three species from West Africa are here described, one of them so peculiar as to warrant the erection of a subgenus for its reception. Type *Prosopis heraldica* Smith.

Nothylaeus heraldicus (Smith).

Prosopis heraldica Smith. Cat. Hym. Brit. Mus. 1:35 ♀ Cape of Good Hope 1853.

This species was taken in numbers visiting the flowers of various species of *Aloe* in the botanical garden in Capetown.

Nothylaeus rufipedioides (Strand).

Prosopis rubriplagiata rufipedioides Strand.
Wiener Ent. Zeitsch. 30:135 ♂ Cape Aug. 1911.

Prosopis Junodi Friese
Archiv. Naturges. 77:131. Transvaal. 1911.

A few specimens of this species were taken with the previous species.

Nothylaeus Braunsi (Alfken).

Prosopis Braunsi Alken
Zeitschr. fr. Syst. Hym. Dipt. 5:147. Cape Colony 1905.

My thanks are due to Dr. L. Peringuey of the South African Museum for a male of this species, taken by Dr. Brauns at Willowmore.

The following species which I have not seen are, from the descriptions, apparently referable here:

Nothylaeus rubrifacialis (Strand).

Prosopis rubrifacialis Strand
Societas Entomologica 27:20 ♀ Togoland. Feb. 1912.

Nothylaeus sansibaricus (Strand.)

Prosopis sansibarica Strand.
loc. cit. 30 ♀ Zanzibar. Mch. 1912.

Nothylaeus nyassanus (Strand).

Prosopis nyassana Strand.
loc. cit. 33 ♀ L. Nyassa. Mch. 1912.

Nothylaeus binotatus (Alfken).

Prosopis binotata Alfken. Deutsch. Ent. Zeitsch. 1914:181 ♀ ♂ South Africa April 1914.

Nothylaeus Magrettii (Vachal).

Prosopis Magrettii Vachal. Bull. Soc. Ent. France 1892: cxxxv ♀. E. Sudan.

Nothylaeus gigas (Friese).

Prosopis gigas Friese. Archiv. f. Naturges. 77:132. ♀ Eritraea 1911.

To these may be added:

Nothylaeus Peringueyi n. sp.

♀ Black, mandibles, labrum, clypeus, suffusion on lower part of supraclypeal area, scape, flagellum beneath and anterior tibiae, knees and femora within ferruginous; lateral face marks acuminate and extending above the middle of the eyes and a dot on the tegulae yellow, legs piceous brown.

Collar, margin of tubercles and interrupted bands on the posterior margins of tergites 1 and 2 with white pubescence.

Clypeus, with the surface uneven, with rather fine shallow punctures distant from each other above twice their diameter, vertex more coarsely and closely and confluently punctate; mesonotum similar, the punctures more discrete, particularly discally; scutellum similar to the disc of the mesonotum, the surface shining; mesopleura more finely and closely punctured; sides of propodeum very finely longitudinally rugulose; above, the basal area is radiately rugulose and there is an inner semicircular enclosure bounded by a fine carina; posterior face of propodeum hexagonal, angulate laterally, radiately rugulose or striolate with the petiole as a center, surface like that of the sides of the propodeum, somewhat obscured by a microscopic appressed cinereous pubescence.

Abdominal tergites microscopically tranversely lineolate, impunctate, 1, 2, and 3 somewhat contracted apically; sternites 2 and 3 with fine scattered punctures.

Wings hyaline, the nervures blackish, first recurrent received near apex of first cubital cell, the second interstitial.

Length 5 mm. Length of wing 4.5 mm.

Described from a single ♀ collected at Oloke Meji, Ibadan, Nigeria, during August or September 1914 (J. C. Bridwell).

Type in the author's collection.

The species is named in appreciation of the opportunity of working for a time at the South African Museum and the kindly assistance afforded me by the director, Dr. L. Peringuey, whose comprehensive studies of South African entomology have made known many and interesting Coleoptera and Hymenoptera of South Africa and thrown much light on the biogeography of Africa, and whose administration has rendered the South African Museum one of the best of provincial museums.

making it an important factor in the development of the sciences of its region.

Nothylaeus yoruba n. sp.

♀ Black, opaque; mandibles, labrum, clypeus except middle line, antennae (flagellum darker above), pronotum (collar suffused with yellowish), legs including coxae, posterior interrupted band on scutellum, and basolateral suffusion on first tergite reddish; narrow longitudinal stripe on clypeus, acuminate mark on sides of face reaching 2/3 of the distance to the summit of the eyes, transverse mark on the supraclypeal area and basal spot on tegulae yellow; wings hyaline, venation blackish.

Rather generally covered with sparse, fine cinerous pubescence, noticeable on the antennal foveae, cheeks, collar, tubercles, mesopleura, sides of propodeum and second and following tergites; tergites 1 and 2 with apical interrupted hair bands.

Clypeus with the surface uneven with very shallow indefinite punctures separated from each other about their own diameter, sides of face and supraclypeal area much the same, a little more definitely punctured; vertex closely and confluently punctured. Mesonotum very closely, rather finely and confluently punctured, appearing granular or shagreened with a low-power lens. Scutellum with the surface somewhat shining, with a little coarser scattered punctures; metnotum knobbed, opaque, with irregularly disposed punctures. Propodeum with a few coarse reticulations at the base of the basal area not extending to the sides or summit but a few rugae there. Mesopleura like the mesonotum, sides of the propodeum with the finer sculpture concealed by the pubescence; posterior face of the propodeum hexagonal, radiately irregularly striolate, angulate.

Abdomen subopaque, tergites microscopically transversely lineolate; the apices of tergites 1-3 but very little contracted.

Described from a single ♀ collected at Oloke Meji, Ibadan, Nigeria, during August or September 1914 (J. C. Bridwell).

Type in the author's collection.

Yoruba, the nation of agricultural negroes occupying a great part of southern Nigeria.

14a. Anylaeus n. subgen. of Nothylaeus.

The bee described below, while agreeing with *Nothylaeus* in the characters drawn from the genital armature and the form of the concealed sternites and in the cephalic characters—labrum, mandibles and supraclypeal area, approaches *Metylaeus* in the peculiarities of the metanotum and scutellum. For the

present it may be referred to *Nothylaeus* but if the female is found to possess the same thoracic structure it may well be considered a genus. Type *Nothylaeus* (*Anylaeus*) *aberraus* Bridwell.

Nothylaeus (Anylaeus) aberrans n. sp.

♂ Black; basal spot on mandibles, spot on basal elevation of labrum, clypeus except upper margin, sides of face evenly narrowed to the eye a little above the antennal sockets, spot on supraclypeal area against the clypeus, obscure stripe on outer side of scape, spot on tubercles, spot on the dorsal one of the two free sclerites of wing base behind tegulae, posterior dot on either side the depression of the scutellum, small spot on base of front and middle tibiae, basal third of hind tibiae, and basitarsi outwardly whitish; rest of tarsi and anterior tibiae and calcaria pale, mandibles except base and flagellum beneath brownish, tegulae piceous, wings hyaline, a little smoky, venation brownish.

Cheeks and occiput with short, loose, scattered plumose hairs; collar posteriorly with a feeble band of plumosity; mesosternum with the surface concealed with erect short plumose pubescence, sides and posterior face of propodeum with fine appressed scattered pubescence but little concealing the sculpture; tergite one with interrupted whitish hair band, on posterior margin (abraded), the remaining tergites with very fine scattered whitish hairs, sternites similar, the last two visible sternites also with a few erect black hairs.

Surface of clypeus uneven, coarsely punctate with ill-defined punctures removed from each other a little more than their own diameter, face and lower part of supraclypeal area with a few similar punctures. Upper part of supraclypeal area, front and vertex very coarsely and confluently punctured, the surface somewhat shining. Supraclypeal area margined with curved carinae above, contracted below, the middle elevated from the contraction, the upper portion nearly in the same plane as the front, with a median low ridge extending to the anterior ocellus.

Collar margined anteriorly, subinterrupted medially, the lateral angles prominent but blunt. Mesonotum with exceedingly coarse unevenly distributed punctures of different magnitudes, the surface between somewhat shining and irregularly transversely striolate, the parapsidal and median furrows well defined, mesopleura evenly and coarsely punctured, the punctures separated by about their own diameter. Scutellum deformed, basally with a few punctures and longitudinally lineolate, posteriorly with a profound, rounded, shining excavation a little anterior to two similar postero-lateral excavations and separated from them by two acute edged carinae extending obliquely to the main plane of the scutellum, the posterior excavations are laterally (and partly dorsally) margined with a translucent almost membranous recurved chitinous process. Metanotum profoundly excavated and shining, bounded

laterally by strong recurved costate margins which are produced posteriorly nearly one-half the median length of the metanotum. Propodeum with the basal area coarsely areolate, the basolateral areas excavated and separated from the posterior face by strong carinae; sides shagreened; posterior face more coarsely so, hexagonal, bounded laterally by carinae profoundly channeled in the middle. Abdomen impunctate above, transversely lineolate, a little shining, tergite 1 strongly contracted apically and 2 basally and apically; sternites similar to the tergites but with some fine scattered punctures. Head broader than thorax, broader than long, eyes strongly converging below, clypeus about as high as broad at apex. Thorax and abdomen rather slender. The first recurrent is received at the apex of the first cubital cell, while the second is interstitial.

The aedeagus very similar to that of *N. heraldicus*, *N. Braunsi*, and *N. rufipedioides*, agreeing with the latter on the gentle curve of the outer side of the stipes and in the greater expansion of the sagittae in the middle as contrasted with *heraldicus* and *Braunsi*.

The eighth sternite has the margins straight on either side the apical process, *rufipedioides* has them nearly so, while they are strongly sinuate in *heraldicus* and *Braunsi*.

Length 5.5 mm., wing 4.5 mm.

Described from one ♂ collected at Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (J. C. Bridwell).

Type in the author's collection.

Nothylaeus (Anylaeus) dentiferellus (Strand).

Prosopis dentiferella Strand.
Soc. Ent. 27:30 ♂ Delagoa Bay, 1912.

By the description this species is similar to *aberrans* but the structure of the scutellum is different and the metanotum (postscutellum) is not described. Strand suggests the possibility of this being the ♂ of *Magrettii* (Vachal).

15. Metylaeus n. gen.

Type the following species.

Metylaeus cribratus n. sp.

♀ Black, mandibles rufous at apex, flagellum brownish beneath, abbreviated interrupted line on collar, tubercles, and a small spot on the knees of the front legs yellowish, wings hyaline, the nervures and stigma blackish.

Sides and posterior face of propodeum with the surface somewhat obscured by minute appressed scattered cinerous pubescence; first tergite with an apical interrupted band of white dense pubescence.

Surface opaque, microscopically lineolate between the coarse cribrate punctures of the head, thorax and first tergite. Punctures of the clypeus large shallow umbilicate, separated from each other a little less than their diameter, those of the face deeper and closer, the eyes are surrounded by a punctate furrow with finer punctures in front, distinctly margined, the margin continued to the level of the anterior ocellus. Eyes converging nearly one-half below, malar space nearly linear, clypeus a little higher than broad, supraclypeal area elevated, triangular, acuminate into a carina disappearing before it reaches the anterior ocellus.

Collar anteriorly carinate, subinterrupted in the middle; mesonotum coarsely, strongly and confluently punctured, parapsidal and median furrows indicated only as straight narrow lines. Tegulae with a few fine shallow punctures. Scutellum a little over 2/5 as long as wide, more sparsely punctured than the mesonotum, its posterior margin impressed on either side the middle and the lateral angle produced into a tooth. Metanotum elevated, impressed in front and behind so that an elevated rina alone connects the two sides, the posterior angles on either side end in a blunt tooth. Superior face of propodeum separated from the sides and posterior face by carinae, the posterior carina costate; the area bounded by a weak carina, the surface bears a few weak coarse wrinkles two of which more or less bound a small triangular inner area and continue after uniting to the posterior carina. Mesopleura more sparsely punctured than the mesonotum. Sides and posterior face of propodeum impunctate, finer sculpture not visible for the fine pubescence.

First tergite strongly punctate, the punctures more separated than on the mesonotum; the remaining tergites only very finely and indistinctly minutely punctured, none of the tergites very much contracted at apex. The first recurrent is received by the first cubital cell near its apex; the second is interstitial or received a little before the second transverse cubitus.

♂ Resembles the female, but the sculpture particularly of the propodeum is somewhat coarser. The teeth of the scutellum and metanotum are more produced, those of the metanotum becoming long spines more than half as long as the distance between them. The second tergite is rather strongly but much more finely punctured than the first and both are strongly contracted at apex.

The markings of the collar are reduced, a triangular yellow spot with the apex down lies beneath the antennae and against the margin of the supraclypeal area and the clypeus but does not touch the orbit, anterior tibiae and tarsi outwardly with a pale stripe.

The discussion of the genitalia given under the genus applies to this species.

Length 4.5--5 mm., wing 5 mm. Some males smaller.

Described from 24 ♀ 14 ♂ collected in August and September 1914 at Oloke Meji, Ibadan, Nigeria (J. C. Bridwell).

Type ♂, allotype and paratypes in the author's collection, paratypes in the collection of the Hawaiian Board of Agriculture and Forestry.

From the descriptions two previously described species belong to this genus:

Metylaeus catalaucoides new name.

Prosopis Bouyssoui Vachal.

Ann. Soc. Ent. France 68:565 ♂ (*nec* ♀) N'Doro 1899.

Metylaeus scutispina (Alfken).

Prosopis scutispina Alfken

Deutsch. Ent. Zeitsch. 1914:195 ♂. Rhodesia.

The former species appears to differ from *cribratus* by the shorter (triangular) metanotal spine and the presence of a yellow spot on the supraclypeal area, *M. scutispina* differs by the red mandibles, labrum, and anterior edge of the clypeus, the rest of the clypeus being yellow. The sculpture of the second tergite in the description is not indicated as different from that of the first.

16. Gnathylaeus n. gen.

The single species described under this genus resembles very closely the male later described as *Hylaeus* (*Nesylaeus*) *nesoprosopoides* and the material from which they were described was taken together. The mandibles of the two are, however, wholly unlike and I have never seen a sexual dimorphism in the family Hylaeidae which would parallel this. The first tergite is different in the two species but not more so than in some *Hylaeus*. I do not, however, believe they belong to the same species.

It will be interesting to examine more material and the generic characters can no doubt be amplified when the male

genitalia can be examined. The genus is nearer *Hylaeus* than to *Gnathoprosopis* but seems sufficiently distinct from either.

The propodeum, supraclypeal area and other characters are apparently as in *Hylaeus*. Type the following species.

Gnathylaeus Williamsi n. sp.

♀ Black; heavy inverted T-shaped mark on clypeus, sides of face to antennae and from there narrowed to the orbits, collar interrupted medially, tubercles, basal internal spot on tegulae, external basal stripe on anterior and middle tibiae and basal half of hind tibiae sulfur yellow; calcaria whitish, apex of mandibles, flagellum beneath and tarsi brownish; wings hyaline, neuration of front wings blackish, of hind wings pale.

Surface of propodeum except the basal area somewhat concealed by fine scattered cinereous appressed pubescence, hind margins of first tergite with a widely interrupted white hair band, second and third tergites with similar hair bands, evident only in certain lights.

Clypeus longitudinally microscopically lineolate and with rather coarse well-separated punctures. Front and vertex closely and confluently punctured. Mesonotum much the same, punctures of scutellum well separated, metanotum shagreened, area of propodeum rugose-shagreened, mesopleura much as the mesonotum.

Abdomen with tergite 1 highly polished and shining with a few shallow minute scattered punctures, second and following tergites less shining with minute shallow punctures distant from each other two or three times their diameters; tergites 1-3 but very little contracted; sternites a little more coarsely punctured.

Length about 6 mm.; wing 4.5 mm.

Described from two ♀ collected at Los Banos, Luzon, Philippine Islands (F. X. Williams).

Type and paratype in the author's collection.

17. Nesoprosopis Perkins.

Dr. Perkins has described a species from China as *Nesoprosopis chinensis*. I have a male which is strictly congeneric with this from the Philippine Islands and I am convinced that these species should be separated from *Nesoprosopis*. This and the new species are referred to a subgenus of *Hylaeus* which I call *Nesylaeus*, since I can find no character to separate these species from *Hylaeus* except the male genitalia.

Nesoprosopis was separated by Dr. Perkins largely on the character of the eight sternite of the ♂ and this does not seem to me to be so strongly different from some species still remaining in the old genus *Prosopis*.

He supplements this character by the lack of enclosure of the basal area of the propodeum. Most of the species have absolutely no clear line bounding this area. However the area is clearly defined in some of the species such as *N. fuscipennis* (Smith) and *N. pubescens* Perkins.

I am inclined in studying the Hylaeidae to give considerable importance to the structure of the supraclypeal area and its extension above between the antennae. While frequently it is not easy to describe this structure, it seems to be very characteristic in the different groups. In this character *Nesoprosopis* differs from *Hylaeus* in the more limited sense which I should use it. In *Nesoprosopis* this area is convex between the antennae and narrowed, rounding down at the sides to the rest of the surface without angles, ridges or carinae; it is also not narrowed in the middle nor expanded and elevated at its summit, but is sub-triangular in form, and with a fine shallow channel leading from near its summit near to the anterior ocellus.

The sides of the propodeum are separated from the posterior face by a sharp angle not rounded off nor on the other hand surrounded by carinae as in many species described as *Prosopis*. This structure is identical with that of typical *Hylaeus*.

18. Hylaeus Fabricius (Latreille emend).

The species of Europe and North America described mainly as *Prosopis* may perhaps some of them be broken off into separate subgenera but generally speaking, those which I have seen seem congeneric. I have not been able to examine many of the European species, but those which I have do not seem readily separable. Generally speaking the species show little differentiation in the character of the edeagus. More variation

exists in the structure of the seventh and eighth sternites but these differences do not seem significant enough to form generic divisions upon. There are, however, differences in the form of the supraclypeal area, of the collar and of the propodeum which may on further study be found to supplement the genital characters. Thus the Boreal American *Hylaeus basalis* (Smith) may well be isolated since there are differences there in bodily structure in addition to the genital characters. On the other hand *Hylaeus pictus* (Smith) of which I have seen specimens from Malaga, while differing greatly in coloration and appearance from other European and the North American species, does not appear to have either genital or somatic characters warranting its removal from the genus *Hylaeus*. While time and the material at my disposal has limited my examination to about thirty Australian species I have not seen any species which seems assuredly referable to *Hylaeus*, tho some seem close to that genus. An interesting color group there is that of the black species with the scutellum and metanotum yellow, which by the examination of the genitalia and somatic structures would fall into about four distinct genera, with ample characters for their separation. From Africa I have seen several species in the group of *Hylaeus curvicarinatus* (Cameron) which are clearly *Hylaeus* but they have excellent group characters which I have considered warrant the erection for them of the subgenus *Deranchylaeus*. Some Japanese species are here described which some of them seem typical, while two of these species are more divergent. I have unfortunately not seen any of the neotropical species.

19. Deranchylaeus n. subgen. of Hylaeus.

In my travels in Africa in 1914 and 1915 besides the species here separated in the genera *Metylaeus* and *Nothylaeus* I found nine species of *Hylaeus* falling into a compact group differing from all other species of *Hylaeus* which I have seen by the supraclypeal area being bounded laterally by two fine outwardly curved carinae and not at all declivous above. The

collar is also broader than usual and is often acute or carinated in front, never subinterrupted. The males have the sides of the seventh sternite with long teeth or spines much as in the *Cressoni* group of North America but the eighth sternite is never bilobate or expanded at apex. The edeagus is ordinary in form for *Hylaeus*. This group is Ethiopian so far as my knowledge goes. Type *Prosopis curvicarinata* Cameron.

The following table will serve to distinguish the species of *Deranchylaeus* collected in Africa during 1914 and 1915 and the notes and bibliography may assist in the study of the group. With the species treated under *Metylaeus* and *Nothylaeus*, it is designed to include in the present treatment all Ethiopian Hylaeidae so far known.

Females.

1. First tergite distinctly punctate, the punctures nearly as large as those of the mesonotum 2
   First tergite impunctate or with very minute punctures 5
2. Clypeus not impressed.....*immarginatus*
   Clypeus impressed subapically..... 3
3. Impression of clypeus not definitely limited above. Mark on the face opposite the base of the antennae narrowed below, subinterrupted line on the collar, spot on the base of the tegulae and on the tubercles whitish ..... *Drègei*
   Impression of clypeus transverse well defined, collar and tubercles dark, knees more or less pale..... 4
4. Clypeus medially subtuberculate above the impression, basal one fifth of hind tibiae pale outwardly....*Haygoodi*
   Clypeus not subtuberculate above the impression; hind knees and tibiae entirely dark..... .....*Lightfooti*
5. Propodeum with the basolateral areas separated from the posterior face by a carina..... 6
   Propodeum with the basolateral areas not separated from the posterior face 7
6. Mandibles, clypeus, supraclypeal area below, lower

angles of sides of face and flagellum ferruginous ..... *xanthostoma*

Flagellum darker, face entirely dark..... .....*longulus*

7. Inner orbits with a very small whitish spot a little above the antennal sockets.....*curvicarinatus*

Inner orbits with a white line reaching much above the antennal sockets ..... *bequaertianus*

Males

1. Apical lobe of 7th sternite hornlike, 1st tergite not strongly punctured 2

Apical lobe of 7th sternite flaplike..... 3

2. 1st tergite microscopically distinctly and evenly sparsely punctured, yellow mark on sides of face contiguous with the eyemargins above .. *curvicarinatus*

1st tergite not distinctly punctured, white marks of sides of face curving over base of antennae..... ..... *bequaertianus*

3. Seventh sternite with the lateral teeth strongly developed, first tergite distinctly and strongly punctate.... 4

Seventh sternite with the teeth feebly developed, first tergite not distinctly punctate..... .....*longulus*

4. Basal area of propodeum not differentiated from the basolateral areas, stipites rounded at apex, not obliquely truncate outwardly 5

Basal area of propodeum strongly differentiated from the basolateral areas, the latter strongly and distinctly punctate, stipites acute at apex obliquely truncate outwardly ..... *immarginatus*

5. Basal area longitudinally rugose, apical process of 8th sternite acute nearly as long as the width, on either side, of the basal part, clypeus shallowly impressed over most of its surface..... .....*Drègei*

Basal area vermiculate and confusedly closely rugulose, process of 8th sternite short, blunt, less than half the width on either side, clypeus convex.....*Lightfooti*

Hylaeus (Deranchylaeus) albonasatus (Strand).

Prosopis albonasata Strand. Soc. Ent. 27:30 ♂ South Africa 1912.

Has a semilunar carina on the third sternite.

Hylaeus (Deranchylaeus) Alfkeni (Friese).

Prosopis Alfkeni Friese.

Zool. Jahrb. Abt. Syst. 35:583 ♂ Rhodesia. 1913.

♀ Pronotum, mesonotum, and apices of tergites 1-3 fringed with white pubescence, face black, 1st and 2d tergites very densely and coarsely punctured.

♂ Similar, scape black, not widened above.

Hylaeus (Deranchylaeus) Arnoldi (Friese).

Prosopis arnoldi Friese. Zool. Jahrb. Abt. Syst. 35:584 ♂ Rhodesia. 1913.

Prosopis xanthopus Alfken.

Deutsch. Ent. Zeitschrift. 1914:197 ♀ Rhodesia.

Alfken gives no reason for separating his species from Friese's from the same locality. The differences appear to be merely sexual.

A coarsely sculptured species with the mandibles, labrum, clypeus, legs and antennae red. Differs from *xanthostoma* by the red legs, those of *xanthostoma* being black.

Hylaeus (Deranchylaeus) aterrimus (Friese).

Prosopis aterrima Friese.

Arch. Naturges. 77:129 ♀ Transvaal 1911.

Prosopis quinquedentata Friese. l.c. 132 ♂ Transvaal.

Prosopis aterrima Alfken.

Deutsch. Ent. Zeitschr. 1914:189 ♀ ♂.

♀ Resembles *immarginatus* but the clypeus has a yellow median line and the lateral face marks are broadened within near the middle.

♂ Clypeus with a yellow median line.

Hylaeus (Deranchylaeus) atriceps (Friese).

Prosopis atriceps Friese.
Arch. Naturges. 77:130 ♀ Transvaal 1911.
Prosopis atriceps Alfken.
Deutsch. Ent. Zeitschr. 1914:187 ♀ (nec ♂).

The male described as *atriceps* ♂ by Alfken is certainly the same as one taken by me at Capetown but the female I have associated with it is not *atriceps* Friese but *tenuis* Alfken. Probably *atriceps* is a distinct species with a more northern distribution. The Capetown species I believe to be *curvicarinatus* (Cameron).

Hylaeus (Denrachylaeus) bequaertianus n. sp.

♀ This species is very like *curvicarinatus* but differs by the characters given in the table, a whitish line extending along the inner orbits to the lower end of the supraorbital foveae. The microscopic punctures of the first tergite are exceedingly shallow and hardly to be distinguished even with a binocular.

♂ The male has the pale coloration whitish rather than yellow and the face marks are curved away from the eye margin over the antennal sockets and in none of the individuals studied is there a trace of a light mark on the supraclypeal area. The apices of all the tibiae are pale while the pale band on the base of the hind tibia is reduced, otherwise practically like *curvicarinatus*.

The genitalia of this species and of *curvicarinatus* are practically alike and the description of this species will serve for both, the differences being pointed out.

Edeagus with the stipites rounded at apex extending to the tips of the sagittae, with a few stout straight acuminate hairs at apex, basal part about as long as the narrow apical part.

Eighth sternite with the apical process truncate at apex; about as long as the width, on either side, of the basal part, the basal part is produced somewhat into a rounded lobe on either side. In *curvicarinatus* the process is a little shorter and rounded at apex.

Seventh sternite with a basal and apical lobe on either side, the apical lobe is chitinous and hornlike but a little compressed, the basal lobe is a little shorter but little chitinized and a little strap-shaped bearing a few long spines or teeth on its anterior margin. In *curvicarinatus* the apical lobe is shorter, less compressed and more hornlike, while the basal lobe is shorter and more rounded and the teeth much feebler, the sinus between the two lobes being conspicuous in *bequaertianus* and hardly perceptible in *curvicarinatus*.

Five ♀ ♀ and seven ♂ ♂ collected at Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (Bridwell).

Type ♂, allotype and paratypes in the author's collection.

Named in honor of Dr. Joseph Bequaert of the American Museum of Natural History, whose recent work on the Ethiopian Vespidae is an example of what systematic work at its best may be.

Hylaeus (Deranchylaeus) Bouyssoui (Vachal).

Prosopis bouyssoui Vachal. Ann. Soc. Ent. France 68:535 ♀ (*nec* ♂). N'Doro 1899.

Hylaeus (Deranchylaeus) capicola (Alfken).

Prosopis capicola Alfken.
Deutsch. Ent. Zeitschr. 1914 ♀ Algoa Bay, So. Afr.

Differs from *longulus* by the finer puncturing of the head the shorter supraorbital fovea, the short yellow line on the clypeus, the yellow line on the pronotum, spot on tubercles and finer puncturing of the thorax.

Hylaeus (Deranchylaeus) curvicarinatus (Cameron).

Prosopis curvicarinata Cameron. Trans. So. Afr. Phil. Soc. 15:236 ♂ Pearston, Cape Colony 1905.

?Prosopis robertiana Cameron.
Trans. So. Afr. Phil. Soc. 16:325 ♂ Pearston, Cape Colony 1906.

Prosopis atriceps Alfken (nec Friese).
Deutsch. Ent. Zeitschr. 1914:188 ♂ (*nec* ♀) Port Elizabeth, Cape Colony, So. Afr.

Prosopis tenuis Alfken.
l.c. 188 ♀ (♂ ?) Algoa Bay, So. Afr.

I have 16 ♀ ♀ and 22 ♂ ♂ which were determined at the South African Museum as *atriceps*. The sexes were associated by breeding them from nests in twigs like those of the European and North American species. After a careful study of the description I find that the female corresponds more closely

with the description of *tenuis* though there are definite strong hair patches on the lateral margins of tergites 1-3 and the length is 5 mm. or a little more. The male agrees well with the ♂ described as the ♂ of *atriceps*. Some of the males have the supraclypeal area dark except a narrow line along the anterior margin. These are similar to the male described as *tenuis* ♂ and belong with the others as proved by the study of the genitalia. After carefully reading Cameron's descriptions of *Prosopis curvicarinata* and *robertiana* I am inclined to believe that both of them refer to the same species and that the material compared as *curvicarinata* with *robertiana* was some other species. The species is apparently the same as *tenuis* Alfken, but only the examination of the types could remove all uncertainty—if it could be ascertained which is Cameron's true type.

The differences of venation mentioned by Cameron are of no importance since I have found the same difference in the venation of males of this species ascertained to be the same by the examination of the genitalia.

Hylaeus (Deranchylaeus) Dregei (Strand).

Prosopis drègei Strand.
Soc. Ent. 27:27 ♂ Cape Colony, So. Afr. 1912.

The ♀ previously undescribed is perhaps sufficiently differentiated in the table. The 1st and 2nd tergites bear apical lateral white hair patches. Length 6 mm.; wing 4.5 mm.

♂ Seventh sternite with the lateral spines very strongly developed on the sides of the middle piece and the posterior (apical) margin of the basal lobes, the apical lobes flaplike, elongate, membraneous.

Median process of 8th sternite elongate (somewhat similar that of *Hylaeus nipponicus* but not so acute nor so strongly chitinized), about as long as the width of the basal part on either side. The sides of the basal part in a straight line with each other.

Edeagus with the stipites about as long as the sagittae.

One ♀ and 2 ♂ ♂ collected at Cape Town, Jan.-Apr. 1915 (Bridwell).

Hylaeus (Deranchylaeus) flaviscutum (Alfken).

Prosopis flaviscutum Alfken.

Deutsch. Ent. Zeitschr. 1914:193 ♀ ♂ Cape 1914

♀ Differs from *immarginatus* in having tergites 1-5 with fine white apical hair bands.

♂ The male has the scape not expanded above.

Hylaeus (Deranchylaeus) gabonicus (Vachal).

Prosopis gabonica Vachal.

Ann. Soc. Ent. France 68:536 ♀ W. Afr. 1899; *Op. Cit.* 72:400 ♂ W. Afr. 1903.

The description of the female is not entirely adequate: the basolateral areas of the propodeum are said to be discrete from the declivity "vix modico jugo" and the wings infuscate, otherwise the species would seem to resemble *bequaertianus* rather closely.

The male is described as having the apex only of the clypeus yellow.

Hylaeus (Deranchylaeus) Gaullei (Vachal).

Prosopis Gaullei Vachal.

Ann. Soc. Ent. France 68:536 ♀ W. Afr. 1899.

Differs from *Drègei* by having two long sulculi on the clypeus and the metanotum with two minute tubercles.

Hylaeus (Deranchylaeus) Haygoodi n. sp.

Drègei, *Haygoodi*, and *Lightfooti* form a closely related group to which probably *Gaullei* also belongs in which the anterior portion of the clypeus is impressed, the first tergite is strongly punctate and the second more finely so, the first tergite has white apical lateral hair patches and the second more feeble ones. The basal area of the propodeum is vermiculate rugose in *Drègei* and *Haygoodi* and more feebly reticulate in *Lightfooti*, in no case strongly defined, the basolateral areas which are not discrete are strongly punctured. In *Haygoodi* the punctures of the 1st and 2nd tergites are stronger and coarser, and less different on the two segments than in the other species. Otherwise I have nothing to add to the characters given in the table.

Described from 1 ♀ collected at Cape Town, Jan.-Apr. 1915 (Bridwell).

Type in the author's collection.

Named in honor of Mr. Haygood, American vice-consul at Cape Town, who in addition to his official duties adds to the enjoyment of Americans in Cape Town by his kindly offices in giving opportunities to enjoy the mountains and their life, in appreciation of courtesies received and help given.

Hylaeus (Deranchylaeus) immarginatus (Alfken).

Prosopis immarginata Alfken.
Deutsch. Ent. Zeitschr. 1914:187 ♀ Algoa Bay, So. Afr.

The ♂ hitherto undescribed has the clypeus except a narrow band along the anterior margin, a triangular spot on the sides of the face filling them to near the summit of the clypeus, from there narrowed to a narrowly extended point on the eyemargin about even with the lower edge of the antennal sockets, spot on the outer base of rfont tibiae calcaria, middle and hind basitarsi except at apex whitish, anterior side of anterior tibiae sordid yellowish, flagellum light brownish beneath.

Scape suddenly expanded at about half its length from the base on the outer side to about twice its width at base.

Seventh sternite similar to that of *Dregei* but the apical lobes shorter, the basal lobes with the apical edges not straight and the teeth sronger and crooked.

Eighth sternite with the apical process short, acute, and about one-half the length of the distance, on either side, of the basal part.

Two ♀ ♀ and seven ♂ ♂ collected at Cape Town Jan.-Apr. 1915 Bridwell.

Hylaeus (Deranchylaeus) krebsianus (Strand).

Prosopis krebsiana Strand.
Soc. Ent. 27:33 ♀ Cape Colony 1912.

Resembles *immarginatus* Alfken but differs by the structure of the clypeus. From the species with the clypeus impressed, *Drègei*, *Lightfooti*, and *Haygoodi*, it differs by the long whitish line along the orbits.

Hylaeus (Deranchylaeus) leucolippa (Friese).

Prosopis leucolippa Friese.

Deutsch. Ent. Zeitschr. 1913:574 ♂.

Zool. Jahrb. Abt. Syst. 35:582 ♂ German South West Africa 1913.

This species agrees with *longulus* in having the labrum and mandibles yellow in the male but the first tergite is strongly punctured. Possibly this is the male of *Bouyssoui*, the male described as such being a *Metylaeus*.

Hylaeus (Deranchylaeus) Lightfooti n. sp.

♀ The characters of the female and its differences from the related species are brought out in the table and in the discussion of *H. Haygoodi*.

Length 6 mm.; wing 4.5 mm.

♂ Resembles the ♂ of *immarginatus* but has the 1st and 2nd tergites much more finely punctured. The lateral face marks extend above the antennal sockets, being narrowed from the supraclypeal area or just beneath the antennal sockets, the supraclypeal area has a white transverse mark at its apex, large spot on tegulae, anterior tibiae outwardly, all the tarsi except the somewhat darkened tips, middle tibiae slightly outwardly at base and apex and basal half (nearly) of hind tibiae whitish yellow; flagellum beneath pale brown, anterior tibiae pale brownish in front.

Scape strongly punctured evenly broadened from the base, nearly twice as broad at apex as the pedicel.

Length 5.5 mm.; wing 4.5 mm.

One ♀ and one ♂ collected at Cape Town Jan.-Apr. 1915 (Bridwell). Type and paratype in the author's collection.

Named for Mr. Lightfoot, assistant in the South African Museum, who has collected many interesting South African insects.

Hylaeus (Deranchylaeus) lineaticeps (Friese).

Prosopis lineaticeps Friese.

Deutsch. Ent. Zeitschr. 1913:573 ♀ Cape Colony.

Zool. Jahrb. Abt. Syst. 35:582 ♀. 1913.

Prosopis lineaticeps Alfken.

Deutsch. Ent. Zeitsch. 1914:190 ♀ ♂ Cape Colony, Natal.

Similar to *Drègei* but there are two narrow furrows leading

from the impression of the clypeus, and the eyes do not converge below.

♂ Has only the first tergite with lateral hair patches and the 3d and 4th sternites have more or less distinct tubercles.

Hylaeus (Deranchylaeus) longulus (Friese).

Prosopis longula Friese.

Deutsch. Ent. Zeitschr. 1913:574 ♂ Rhodesia.

Zool. Jahrb. Abt. Syst. 35:583 ♂. 1913.

Prosopis longula Alfken.

Deutsch. Ent. Zeitschr. 1914:192 ♂ Rhodesia.

The ♀ has not been hitherto described.

♀ Black; anterior knees and tibiae in front and spot on tegulae yellow, flagellum light brown beneath, tarsi a little brownish, wings hyaline, the nervures brown.

Head a little longer than broad, the eyes converging below; clypeus, lower portion of supraclypeal space and sides of face longitudinally lineolate with very shallow rather coarse punctures separated by less than their diameter, those on the sdies of the face coarser and more distinct; genae longitudinally lineolate with 4 series of large shallow umbilicate punctures, front much more strongly punctate, the punctures seriate along the orbits, interstices tessellate; vertex unevently punctate the punctures along the occiput confluent; suleate longitudinal carina of he middle of supraclypeal area not strong but approaching the anterior ocellus, supraorbital fovea reaching the level of the summit of teh eye.

Collar with the anterior margin acutely carinate, a median hair patch on its surface, anterior angles acutely subdentate, the surface uneven very minutely tessellate but impunctate mesonotum with strong deeply impressed coarse punctures confluent anteriorly, from the anterior third posteriorly, the punctures discrete, separated by their own diameter or more interstices strongly tessellate, scutelum similar, metanotum contrasting, the punctures coarser and closer, the tessellation of the interstices stronger; mesopleura similar to the mesonotum. Basal and basolateral areas of propodeum discrete, separated from the posterior face by a strong carina. Basal area with some reticulate pits anteriorly limited by an irregular carina, the rest and the basolateral areas coarsely irregularly reticulate, the surface tessellate, shining. Sides of propodeum opaquely tessellate, finely, strongly and closely punctate, separated from the basolateral and posterior areas by carinae, the posterior face rather coarsely reticulate, the furrow rather narrow and definitely marked.

Tergites transversely lineolate tessellate, the first microscopically sparsely shallowly punctate, appearing impunctate with a hand lens.

Tergite 1 apically and 2 basally and apically a little contracted; sternites similar but distinctly irregularly finely and sparsely punctate.

Pubescence noticeable only on sides of pronotum, middle of collar, lateral apical hair patches on tergite 1, emargination of sternite 5, apical silvery patches on outer tips of the tibiae and a basal one on hind tibiae, and the tarsi.

First recurrent received by 1st cubital cell, second interstitial.

Length 5.5 mm.; wing 4 mm.

♂ Stipites acute, extending beyond the sagittae; 8th sternite with the apical process V-shaped, the sides not produced; 7th sternite with he teeth rather feeble but long, the apical lobe long and strap-shaped, much longer than the basal.

Two ♀♀ and two ♂♂ collected at Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1914 (Bridwell).

The ♀ differs from *Bouyssoui* Vachal in the mesonotum being not longitudinally impressed, the collar black, and the first tergite practically impunctate.

Hylaeus (Deranchylaeus) rugipunctus Alfken.

Prosopis rugipuncta Alfken.

Deutsch. Ent. Zeitschr. 1911:192 ♀ ♂ Cape Colony.

♀ Differs from *immarginata* in the yellow collar and coarser puncturing of the abdomen and the basal area of the propodeum is margined behind.

♂ Has the supraclypeal area black, scape not widened.

Hylaeus (Deranchylaeus) xanthostoma (Alfken).

Prosopis xanthostoma Alfken.

Deutsch. Ent. Zeitschr. 1914:196 ♀ ♂ South Africa, Belgian Congo.

One ♀ Oloke Meji, Ibadan, Nigeria, Aug.-Sept. 1911 (Bridwell).

20. Nesylaeus n. subgen. of Hylaeus.

The species which is described below is so similar in form and general structure to the species of *Hylaeus* that I can find no external structure distinguishing it. It has, however, the eighth sternite bearing an apical process similar to that of

Nesoprosopis anthracina Smith but somewhat more slender and a little less erect in its origin from the basal plate of the sternite. The edeagus, however, has the stipes greatly elongate and attenuate as described in the genus *Nothylaeus*. The basal area of the propodeum is undefined with a few transverse weak and indefinite rugae. Type *Hylaeus* (*Nesylaeus*) *nesoprosopoides* Bridwell.

Hylaeus (Nesylaeus) nesoprosopoides n. sp.

♂ Black, spot on anterior basal margin of mandibles, spot on labrum, clypeus except anterior and fine upper lateral margins, sides of face narrowed at the antennal sockets and above them rounded off to the eye, spot on the supraclypeal area, obsolescent spot on base of scape, line on the collar narrowed inwardly and interrupted, tubercles, basal half of tegulae, anterior knees and tibiae outwardly, large spot on base of middle tibiae, basal half of hind tibiae, basitarsi and second joints of tarsi yellow; calcaria pale; tarsi brownish beyond second joint; flagellum not perceptibly paler beneath; wings hyaline, the nervures brownish.

Cheeks, occiput and mesopleura with fine scattered, pale hairs, collar feebly pubescent behind, mesonotum with fine, evenly placed, sparse yellowish hairs, sides of propodeum and its posterior face with the surface more or less concealed by fine rather close appressed plumose pubescence. First and second tergite with interrupted white hair bands on the apical margins. Second and following tergites with scattered decumbent fine, dark hairs.

Clypeus except at apex, supraclypeal area, and sides of face longitudinally lineolate and sparsely punctured, front and vertex strongly and very densely punctured with moderate subconfluent punctures, the surface somewhat shining. Mesonotum similarly punctured, the punctures a little more separated, the surface duller, microscopically tessellate; mesopleura similar; scutellum similar bu the punctures coarser, unevenly spaced and removed from each other by more than their own diameter, mesonotum similar but the punctures very shallow; area of propodeum entirely indefinite, shining, with a few indefinite, irregular transverse rugae,rounded evenly down to the posterior face which has a deep longitudinal median sulcus, carinate laterally, some shallow oblique punctures are visible above the pubescence, and surface pubescent below apparently above the pubescence, and surface where it is pubescent is apparently rather densely punctured.

First tergite highly polished and shining, almost impunctate medially laterally rather closely and strongly punctured, second tergite rather evenly and strongly though finely punctured, the surface duller as are the remaining tergites, second tergite contracted apically and basally, the third apically, the sternites shining and sparsely shallowly punctured.

A compact species, the head as broad as the thorax, about as broad as long, eyes strongly convergent below, scape not strongly dilated, arched on the side next the head. Pronotum with the collar rounded, narrowed and subintrrupted medially, the angles not prominent. First recurrent received by the first cubital cell near its apex, the second interstitial or nearly so.

Length 5.5 mm.; wing 4.5 mm.

Described from one ♂ collected in 1917 at Los Banos, Philippine Islands (F. X. Williams).

Type in the author's collection.

Hylaeus (Nesylaeus) chinensis (Perkins).

Nesoprosopis chinensis Perkins.

Trans. Ent. Soc. Lond. 1911:725 ♂. China.

21. Japanese Hylaeus.

Frederick Smith described two species of the genus from Japan under the names of *Prosopis floralis* and *Prosopis perforata* (Tr. Ent. Soc. Lond. 1873:199) and Vachal one *Prosopis globula* (Bull. Mus. Hist. Nat. Paris 9:132, 1893). *Hylaeus floralis* (Smith) by the description closely resembles the species described below as *Hylaeus guathylaeoides* but differs in slight details of coloration of the legs and in the coloration of the wing veins. I should, however, consider my species the same except for the different male which I associate with these females. *H. floralis* is described from Hiogo on the southern coast while *H. guathylaeoides* comes from the mountains of the interior. *Hylaeus perforatus* is said to differ from *floralis* in having the head longer and the clypeus with only the anterior margin pale and the truncation of the propodeum abrupt with the margins somewhat raised. I have not been able to consult the description of *Hylaeus globulus* (Vachal) and do not know if it is identical with one of the following species. *Prosopis Miyakei* Matsumura from the island of Sakhalien, from the description, (Jour. Coll. Agr. Sapporo 4:108, 1911) is not a *Hylaeus* but probably belongs to the Halictidae, perhaps to *Evylaeus* Robertson.

Mr. Frederick Muir has collected the species which are now described. These may be tabulated as follows:

FEMALES.

1. With some yellow coloration, head not elongate, area of propodeum rather coarsely rugose only in one species smooth apically ---------- 2
   Entirely without yellow coloration, head somewhat elongate ---------- *Hylaeus niger*
2. Sides of face more or less yellow, posterior face of propodeum not surrounded by strong carinae---------- 3
   Head entirely black, propodeum with the posterior face surrounded by strong carinae except where the basal area rounded by strong carinae except where the basal area extends over upon the declivity---------- *Hylaeus nipponicus*
3. Clypeus without yellow markings, supraclypeal area not contracted in the middle and expanded and furrowed above 4
   Clypeus with a median longitudinal mark, supraclypeal area slightly contracted in the middle, a little expanded and strongly elevated and channeled above---------- *Hylaeus gnathylaeoides*
4. Edge of collar rounded, the pubescence on its posterior face rather feeble ---------- 5
   Edge of collar subcarinate, acute, the pubescence on its posterior face relatively strong and plumose---------- *Hylaeus Matsumurai*
5. Smaller species (5 mm.); lateral face marks in a line along the orbits; tegulae with a yellow spot; collar more narrowed medially; punctures of mesonotum shallower---------- *Hylaeus paulus*
   Larger species (7 mm.); lateral face marks triangular, tegulae black; punctures of mesonotum closer and deeper ---------- *Hylaeus monticola*

MALES.

1. Third sternite simple ---------- 2
   Third sternite with a spine on either side the disc connected by a ridge---------- *Hylaeus gnathylaeoides*
2. Scape not greatly widened ---------- 3
   Scape broader than long, about five times as wide as the pedicel ---------- *Hylaeus nipponicus*
3. Supraclypeal area entirely, stripe on scape, small spot on tubercles, etc., yellow, apical lobe of seventh sternite more feebly developed---------- *Hylaeus monticola*
   Supraclypeal area except margins, scape and tubercles dark, apical lobe of seventh sternite more strongly developed ---------- *Hylaeus* sp.

Hylaeus niger n. sp.

♀ Entirely without yellow coloration, black, calcaria pale, tarsi brownish. Head elongate. Clypeus and sides of face longitudinally lineolate with sparse shallow punctures, vertex more densely, deeply and finely punctured; mesonotum more finely punctate; mesopleura a little shining more sparsely punctate, scutellum a little shining, sparsely punctured; metanotum with the area rough chartaceous basally, smooth and shining apically, sides and posterior face very shallowly punctate.

Tergites rather highly polished but not very highly shining, the minute pilosity somewhat obscuring the reflections. Tergites not contracted, only a very faint trace of apical hair bands. Sternites transversely lineolate with irregular minute punctures from which the hairs arise.

Wings subhyaline, neuration brownish, recurrent nervures interstitial.

Form slender, abdomen elongate, eyes slightly converging below, collar rounded above, not narrowed or sub-interrupted in the middle, supraclypeal area contracted in the middle, expanded and elevated above and bearing a sulcus which continues a short distance on the front.

Length 7 mm.; wing 5 mm.

Described from two ♀ collected at Chinzenji (4000-5000 ft.) July-August 1913.

Type and paratype in the author's collection.

Hylaeus nipponicus n. sp.

♀ Head entirely black. Propodeum with the basal area well defined coarsely irregularly reticulately, the posterior face bounded by carinae except where the apex of the area extends over upon it, basolateral areas well defined by carinae.

Black; spot on tubercles, one on the tegulae, front and middle knees and basal half of hind tibiae yellow, calcaria pale, flagellum brownish red beneath, wings brownish hyaline, the nervures brownish.

Clypeus with the surface opaque irregularly longitudinally lineolate with faint, shallow scattered punctures, supraclypeal area similarly but more regularly lineolate, sides of face similar but the lineolations increased to striations against the eyes; vertex and front somewhat shining strongly and discretely punctate; occiput transversely lineolate or striate; mesonotum similar to the front, the parapsidal and median lines well indicated but not impressed; scutellum similar; mesopleura similarly but more coarsely punctured, somewhat striate above; sides and posterior face of propodeum chartaceous or finely rugulose.

First tergite highly polished and shining with a few widely scattered, minute punctures, the remaining tergites less highly polished and the reflections broken by the minute pubescence; tergites 1-3 but very little contracted; sternites transversely lineolate, more definitely punctured.

A short, compact species, the head short, eyes not very strongly convergent below, supraclypeal area, a little contracted medially, expanded and elevated above, bearing a fine furrow which extends over the front to the anterior ocellus. Colla, acute in front, narrowed or subinterrupted in the middle. The recurrent nervures interstitial or nearly so.

♂ Scape broader than long, about five times as wide as the pedicel, strongly concave on the side next the head.

Black; clypeus, spot rounded above on supraclypeal area, sides of face to above the antennae rounded a little away from the orbit above, longitudinal stripe on outer side of scape, spot on tegulae and tubercles, knees, tibiae and tarsi, except large subapical inner infuscate spots on anterior and middle tibiae and a dark subapical mark surrounding hind tibiae subapically, yellow.

Eighth sternite with the basal process strong, dorsoventrally expanded, the apical process elongated, strongly chitinized as seen from the side with a carina ending in a tooth about half way to the end, the end is acuminate and regularly curved ventrally from the plane of the sternite. Stipes regularly rounded at apex with a few plumose brown hairs, exceeding a little the sagittae and the inner margin curved for their reception, the narrowed portion longer than the broader basal portion.

♀ Length 6.5 mm.; wing 5 mm.; ♂ 5.5 mm.; wing 4.5 mm.

Described from nine ♀ and one ♂ collected at Karuizawa, September 1913.

Type ♀, allotype and paratypes in the author's collection, paratypes in the collection of the Hawaiian Sugar Planters' Association.

Hylaeus gnathylaeoides n. sp.

♀ Clypeus with a broad longitudinal mark not attaining the margin (and 2 subapical lateral spots in the paratype) and (paratype) a spot on the supraclypeal area yellow. Supraclypeal area slightly contracted in the middle, a little expanded and strongly elevated and channeled above, the channel extending feebly to the anterior ocellus.

Black, longitudinal mark on clypeus, sides of face to the level of the summit of the clypeus and triangularly extended along the orbit a little above the superior margin of the antennal sockets, sometimes a supraclypeal spot, band on collar narrowed and interrupted medially, large spots on tegulae and tubercles, anterior knees, stripe on tibiae outwardly and tarsi, outer base of middle tibiae, and basal half of hind tibiae yellow; flagellum beneath, tarsi and margins of abdominal segments brownish, calaria pale. Wings hyaline, the venation brownish.

Clypeus, supraclypeal area, and sides of face longitudinally lineolate or striolate, with shallow, sparse indications of punctures; front and vertex a little shining, strongly and closely punctured; mesonotum opaque

closely and strongly, a little more finely punctured; mesopleura similar; scutellum a little more sparsely and coarsely punctured; metanotum coarsely chartaceous or rugulose, opaque; area of propodeum with a few rather coarse, irregular reticulations basally, nearly smooth apically, sides with fine sculpture concealed by the fine, scattered pubescence, the posterior face lineolate chartaceous, carinate laterally below.

First tergite highly polished and shining, the second and following a little more obscure from the fine scattered pubescence. Without definitely indicated hair bands and apical margins not noticably contracted; sternites a little more pubescent and minutely punctate.

A stout, compact species, the head broad, the eyes converging below the pronotum with the anterior margin of the collar rounded, the collar narrowed and subinterrupted in the middle, the recurrent nervures interstitial or nearly so.

♂. Third sternite with a spine on either side the disc and connected by a ridge.

Scape enormously enlarged, the lower side prolonged beyond the insertion of the flagellum, the upper (inner) side more expanded below.

Black, clypeus except a linear lateral border, labrum and mandibles largely, dot on the genae behind base of mandibles, another on the temples a little below the summit of the eyes, sides of face to above the antennae obliquely rounded from near the orbit to the antennae, spot on upper part of supraclypeal area, scape except infuscated longitudinal discal area, pedicel, spot on either side the neck, collar nearly continuous with the tubercles, base of tegulae, knees, tibiae and tarsi except inner apical infuscate areas on tibiae yellow (reddened by cyanide in the material described). The marks on the underside of the head and on the neck absent in ♂ paratype.

Seventh sternite with two very small simple lateral lobes apically Eighth sternite with a basal process, the apical process nearly straight sides narrowed apically and curved, the apex strongly chitinized and dorso ventrally thickened. Stipites longer than sagittae evenly narrowed on the inner (median) side to apex from base (no distinction of apical and basal parts).

♀ Length 6 mm.; wing 4.5 mm.; ♂ length 4.5 mm.; wing 3 mm.

Described from two females and two males, the former collected at Karuizawa September 1913, the latter merely labelled Japan.

Type, allotype and paratypes in the author's collection.

Hylaeus Matsumurai n. sp.

♀. Edge of collar subcarinate, acute, the pubescence on its posterior edge (relatively) strong and plumose.

Black; sides of face truncate below the lower edge of the antennal socket and acutely produced along the eye margin sometimes above the

upper edge of the antennal sockets, tubercles, basal spot on tegulae, basal half of front tibiae outwardly, basal spot on middle tibiae, and basal half of hind tibiae yellowish; calcaria pale, wings yellowish hyaline, the venation brownish.

Second and following tergites with declined scattered hairs especially on the margins where they simulate hair bands.

Clypeus, supraclypeal area and sides of face longitudinally lineolate, coarsely punctate with shallow punctures, those on the clypeus separated by a little more than the diameter of one, front a little shining, rather coarsely and closely punctured, vertex a little more discretely so. Mesonotum opaque, similarly punctured, punctures separated by a little more than the diameter of one, scutellum a little more shining, similarly punctured; mesopleura a little more deeply and unevenly punctured; area of propodeum strongly reticulate, the ridges very strong, sides of propodeum obliquely punctured more or less separated from the basolateral areas (which are weakly reticulate) by a Y-shaped carina, which also separates the sides from the posterior face. Sculpture of the posterior face irregular, partly concealed by appressed scattered plumose pubescence.

First tergite smooth and shining, the second and following less shining with scattered minute punctures, second a little contracted at apex; sternites similar to the tergites but the punctures stronger, all the margins a little translucent. A species of the aspect of the *modestus* group. Head about as broad as long, eyes a little convergent below. Recurrent nervures interstitial or nearly so.

♀. Length 7.5 mm.; wing 5.5 mm.

Described from 7 females collected at Karuizawa, September 1913. In the material are three ♀ taken at Okitsu in June, 1913, and one marked Japan which may either represent the same species or another closely allied.

Types and paratypes in the author's collection. Paratypes in the collection of the Hawaiian Sugar Planters' Association.

Named in honor of the eminent entomologist, Shonen Matsumura.

Hylaeus paulus n. sp.

♀. Smaller species, lateral face marks in a line against the orbit reaching about to the level of the summit of the clypeus, tegulae with a yellow spot. Collar more narrowed medially, punctures of the mesonotum shallower.

Black; face marks in the type reduced to a line along the orbits, a spot on the tubercles and tegulae, anterior tibiae with a short basal outward stripe or spot, spot on outer base of middle tibiae and basal 1/3 of hind tibiae yellow, calcaria pale, flagellum pale brownish beneath; apical tarsal joints brownish; wings hyaline, the nervures brownish.

Clypeus, supraclypeal area, and sides of face opaque, irregularly longitudinally lineolate or striolate with indications of sparse, shallow punctures; front and vertex a little shining, finely and strongly discretely punctured; mesonotum similarly but more shallowly punctured, the surface between the punctures tessellate or lineolate; mesopleura similar; scutellum similar, a little more sparsely punctured; metanotum irregularly lineolate and definitely sparsely punctured; area of propodeum strongly reticulate basally more or less chartaceous apically, sides and posterior face shagreened, posterior face angulate at the sides.

First tergite highly polished and shining, with sparse, fine punctures rather regularly disposed; second and following a little less shining from the fine scattered pubescence and a transverse microscopic lineolation. Tergites 1-3 a little contracted at apex and with a slight trace of apical interrupted hair bands. Sternites transversely lineolate tessellate.

A rather elongate little species, the head a little longer than wide, eyes feebly convergent below. The recurrent nervures interstitial or nearly so.

♀. Length 5 mm.; wing 4 mm.

Described from one ♀ specimen collected at Karuizawa September 1913.

Type in the author's collection.

Hylaeus monticola n. sp.

♀. Larger species, the face marks in the type triangular not reaching above the level of the lower margin of the antennal pit and not filling the sides of the face, tegulae black, the punctures of the mesonotum closer and much deeper, the metanotum is rough surfaced and the punctures closer but less evident, the markings of the anterior and middle tibiae are greatly reduced; the sculpture of the propodeal area inclines to be striate, longitudinally carinate, the puncturing of the first tergite is absent and this is microscopically transversely lineolate. The wings are yellowish hyaline. The head is shorter and the eyes more convergent.

♂. Line on the anterior base of mandibles, clypeus except narrow apical line and sutures very finely, sides of face obliquely truncate above from the middle of the supraclypeal area, the upper margin arcuately emarginate opposite the antennal sockets, the angle against the eye margin not reaching above the middle of the antennal sockets, supraclypeal area notched above, stripe on scape in front, small spot on tegulae, suffused spot on anterior femora in front and at the knee, on anterior tibiae in front, spot on middle tibiae on exterior base, basal 3/4 of middle and hind basitarsi, and basal one-third of hind tibiae sulfur yellow; flagellum pale brownish beneath, tarsi otherwise brownish.

Edeagus, seventh and eighth sternites closely resembling those of *Hylaeus episcopalis* (Cockerell) as figured by Metz and in material which I have determined as that species from my own collection, differing principally from that species by the feebler development of the apical lobe of the seventh sternite. The figure of the edeagus of *H. episcopalis* does not give a good impression of its structure, if my determination is correct. In both that species and *H. monticola* the sagittae are abruptly divergent a little beyond the base and then convergent and each sagitta bears a small lobe at the divergence, its apical limit marked by a notch.

Scape little expanded, arched; second tergite contracted at apex, third more feebly.

♀ Length 7 mm.; wing 5 mm.; ♂ Length 6.5 mm., wing 7 mm.

Described from two ♀ and four ♂ specimens collected at Chinzenji (4000-5000 ft.) July-August, 1913.

Type, allotype and paratypes in the author's collection.

Hylaeus sp.

♂ Similar, supraclypeal area broader, yellow only along the margins, scape and tubercles black, front basitarsi pale, band on hind tibiae shorter. Edeagus, seventh and eighth sternites much as in the preceding but the apical lobe of seventh sternite more developed and the stem of the process of eighth sternite a little more contracted before the apex Length 5.5 mm.; wing 4.5 mm.

This male I could not associate with any of the females with any certainty and, since the single specimen (Nikko August, 1913,) did not make the coloration-characters sure, it seemed better to leave it unnamed rather than establish a name in this difficult section of the genus.

There are doubtless many other species of the genus in Japan remaining to be studied.

22. North American Hylaeus.

Metz in his excellent paper on the North American *Prosopis* (Tr. Am. Ent. Soc. 37:85-146, 1911) has laid a good foundation for the study of the North American species. He has not, however, had sufficient grasp of the geography of North American entomology and on that account and on account of his attributing too great variability to the species in

regard to sculpture he has fallen into some errors in his account of the species. Crawford has pointed out (Can. Ent. 45:154-156, 1913) his error in sinking *Hylaeus mesillae* (Cockerell) as a variety of the widely distributed *H. Cressoni* (Cockerell). I wish here to make some additional notes and comments.

Hylaeus basalis (Smith).

This is a species of the Boreal and Transition zones and seems to be confined to them. All the specimens I have taken have been from the mountains in California and Oregon. Metz speaks of it as not restricted in its destribution. My localities for it are Oregon: Cascade Mountains,—Detroit, Mt. Jefferson, Three Sisters; Coast Mountains—Benton Co. (J. C. Bridwell). California: Siskiyou Mountains (F. W. Nunenmacher). San Jacinto Mountains (Bridwell).

Hylaeus Nunenmacheri n. sp.

The well-marked *Hylaeus basalis* (Smith) has hitherto remained rather isolated. Metz' *H. potens* only known in the male sex has genital characters similar but is quite different externally from *basalis*. It was with interest that I have discovered mixed with my material of *basalis* a very similar but smaller species.

♀ Clypeus a little broader in proportion more sparsely punctured, the punctures less oblique, the surface less lineolate, particularly apically; sculpture of basal area feebler and its integument more shining. The rugae are confined to a few short weak longitudinal ridges along the anterior margin while there are some reticulations in *basalis*. In both species the integument of the area behind the rugosities is microscopically tessellate but it is shining as seen with a hand lens in *Nunenmacheri*, opaque in *basalis*, due to the greater impression of the lines bounding the tessellations in the latter.

Length 7 mm.; wing 5.5 mm.

♂ Clypeus shorter and broader than in *basalis*. The integument of the area duller than in the ♀ but the rugae similar.

Seventh sternite with the lateral lobes more transverse than in *basalis* the sinus between them less profound, their posterior margin brace-shaped —'—, while in *basalis* the posterior sinus is profoundly V shaped and the sides are rounded off toward the base.

On the 8th sternite the short median apical process is shorter and the sides of the basal part in a straight line with each other, while in *basalis* they gently recede from each other.

Length 7 mm.; wing 4.5 mm.

Two ♀ and one ♂ Siskiyou Co., California, June 2, 1911 (F. W. Nunenmacher); one ♂ Santa Cruz Mountains, Santa Clara Co., Cal., April 25, 1913 (Bridwell).

♂ Type, allotype, and paratypes in the author's collection.

Named in honor of F. W. Nunenmacher, whose remarkable ability as a collector has revealed many new and interesting California and Arizona insects.

Whether the fact that the coastal mountains of California where this species has been discovered were insular during the Tertiaries has anything to do with its evolution from *basalis* remains to be elucidated.

Hylaeus conspicuus (Metz).

Corvallis, Oregon; Benicia, Berkeley, Santa Cruz Co., San Gabriel Mountains, California (Bridwell).

Hylaeus tridentulus (Cockerell).

Mt. Jefferson, Oregon; Coast Mountains, Benton Co., Ore. (Bridwell). Apparently a Transition species.

Hylaeus varifrons (Cresson).

Oregon: Crater Lake (O. H. Swezey), Three Sisters, Mt. Jefferson (J. C. Bridwell).

New Hampshire: Durham (J. C. Bridwell). Another Transition species.

Hylaeus episcopalis (Cockerell).

I am convinced that at least three species of males are confused in Metz' treatment of this species, but I am not yet prepared to assign names for them on account of the involved synonymy.

Hylaeus maritimus n. sp.

♀ Black, elongate spot on the sides of the face obliquely truncate to the eye margin at the level of the middle of the antennal socket, interrupted band on collar not greatly narrowed within, tubercles, spot on the subhyaline tegulae, spots on the outer base of front and middle tibiae, basal third of hind tibiae (band prolonged outwardly) yellow. Flagellum pale brown beneath; margins of tergites and sternites testaceous, subhyaline. Wings brownish subhyaline, venation brownish.

Pubescence of head scattered, collar feebly pubescent on its posterior side, plumose pubescence well developed on the posterior angles of the propodeum. Interrupted whitish hair band on posterior margin of first tergite and a thinner and less definite one on second, surface of second and following tergites with fine scattered declinate hairs and some longer and more erect ones.

Supraclypeal area and clypeus longitudinally lineolate, obliquely punctured with piligerous punctures, those of the apical half of the clypeus distant from one to two times the diameter of a puncture, lineolations of the sides of the face obliquely longitudinal, directed to the clypeus, front longitudinally aciculate-punctate, vertex more definitely and discretely punctured, occiput transversely lineolate or minutely rugulose. Mesonotum opaque closely and shallowly punctured, the punctures not separated by one-half the diameter of a puncture; mesopleura more shining, more finely and sparsely punctate, contrasting with the opaque longitudinally rugulose metapleura; scutellum similar to the mesonotum; metanotum more opaque with very shallow almost contiguous punctures; propodeum with the area only fairly well defined, rather coarsely (microscopically) tessellate with a few rugae or reticulations at the base these variable but not much developed, sides and posterior face of propodeum shagreened, posterior face angulate at the sides, not carinate, the basolateral areas not defined.

Tergite one microscopically sparsely punctate, the surface smooth and a little shining, microscopically transversely lineolate, remaining tergites similar but less shining from the pubescence, tergites not perceptibly contracted; sternites similar but with minute punctures.

Head greatly developed longer than broad, inner orbits sinuate, feebly converging below, supraclypeal area but little elevated in the middle and gradually descending to the plane of the front, margins angled between the antennae, the furrow continued feebly to the anterior ocellus, temples broader than the eyes as seen from above, collar with rounded margin a little narrowed medially. Recurrent nervures received by the second cubital cell or the second interstitial.

Length about 6.5 mm.; wing 5 m.m.

♂ Similar to the female, triangular spot at apex of scape, clypeus, supraclypeal area, sides of face with a clavate extension extending from the lower edge of the antennal socket to above its upper edge; stripe on front tibiae, apical as well as basal spot on middle tibiae, and basi-

tarsi whitish yellow, rest of front tibiae and the tarsi brownish (other pale markings as in ♀).

Eighth sternite similar to that of *H. Cressonii* but the stem shorter and the lobes more developed (as long from the base of their expansion as their stem). Membraneous flap of seventh sternite more developed and hairy, the teeth of the other flap fewer and larger, more or less hooked at the end.

Length about 5.5 mm.; wing 4 mm.

Described from 16 ♀ and 1 ♂ taken in the vicinity of Lake Merced in the sand dune district of San Francisco, Cal., 1 ♀ July 17, 1903 (F. E. Blaisdell), remainder August to Sept., 1910, (J. C. Bridwell).

A very distinct species related to *H. conspicuus* (Metz), *Cressonii* (Cockerell) and *rudbeckiae* (Cockerell). The female is distinguishable by the large head and the translucent margins of the abdominal segments while the male may be separated from that of *conspicuus* by the absence of the peculiar flattened impression over the basal portion of the clypeus, lower part of supraclypeal area and adjacent sides of the face; the supraclypeal area is narrower and the scape is less expanded and has far less yellow on it, the white hair bands on tergites 1 and 2 present in *maritimus* and not in *conspicuus*. *H. rudbeckiae* (Cockerell) ♂ is also similar but has the baso-lateral areas of the propodeum well defined by a carina separating them from the posterior face. Both these species which resemble *maritimus* most closely have the eighth sternite quite different, as may be seen from Metz' figures. Apparently *Hylaeus Stephensi* (Crawford) is very close to this in the structure of the hidden sternites but the face markings are quite different in both sexes.

Hylaeus oregonensis n. sp.

I have a form of this genus which is represented in my collection by two ♀ and two ♂ collected in the high Cascade Mountains of Oregon, Mount Jefferson (Bridwell), which seem to differ but little externally from what I have identified as *H. polifolii* except that the reticulations of the propodeal basal area and particularly the basolateral areas are more strongly developed and the clypeus at the summit seems a little broader. I had supposed that this would prove to be *nevadensis*, but

while the examination of the concealed sternites reveal a seventh sternite like that figured by Metz for *nevadensis*, the eighth sternite is indistinguishable from that of his *H. calvus*.

Type ♂, allotype, and paratypes in the author's collection.

Hylaeus nevadensis (Cockerell).

One ♂ collected at Big Lake near Mt. Washington, Oregon (Bridwell) seems certainly this species. The narrow margin of the supraclypeal area is white like the clypeus and sides of the face. This is the case also in some individuals of *H. polifolii*.

Palaeorrhiza imperialis (Smith).

Prosopis imperialis Smith. Jour. Linn. Soc. Zool. 7:44 ♀ Dory 1863.

Prosopis malachisis Friese (*nec* Smith). Ann. Mus. Hung. 7:184 ♂ Teninber Larat 1909.

Palaeorrhiza Muiri Perkins. Ann. Mag. Nat. Hist. (8) 19: 103 ♂ Amboina 1912.

The description of *Prosopis malachisis* Friese ♂ does not mention the carinae on the third nor the angulate second sternite but otherwise agrees perfectly.

One ♂ collected on Amboina July-August 1908 (F. Muir).

It seems likely *Prosopis malachisis* Smith is also a *Palaeorhiza*.

(?) DIPHAGLOSSIDAE

22. Binghamiella antipodes (Smith).

Sphecodes antipodes Smith. Cat. Hym. Brit. Mus. 1:37 ♀. 1853.

Binghamiella antipodes Cockerell. Bull. Am. Mus. Nat. Hist. 23:235. 1914.

2 ♀ 3 ♂ Stradbroke I. Moreton Bay, Queensland (J. C. Bridwell), Sept. 20, 1915.

The tongue of this bee is truncate at apex, scarcely emarginate, ciliate at apex, excavated above, the paraglossae about as long, obliquely deltoid,

labial palpi 4-jointed rather stout and short about as long as the tongue, the basal joint longest, apical joints subequal. Apical portion of maxilla ovate, expanded, sinuate or subemarginate within and without near the apex hyaline within, labrum transverse, ciliate anteriorly with a short weak median process basally elevated into a ridge, notched medially. Upper inner margin with a narrow fovea.

♀ Antennae with pedicel and flagellar joints 1 & 2 subequal, following joints subequal, a little broader than long to a little longer than broad. Tergites 2 and 3 with a narrow transverse submedian impressed line. Pygidial area strongly narrowed near the base, narrow and truncate at apex, longitudinally, subcarinate medially.

♂ This sex has not previously been described. It is very much like the ♀. The abdomen a little smaller and narrower. Face clothed with coarse silvery hairs as in *Sphecodes*, mandibles with a single subapical tooth within (the ♀ has two), antennae about as long as the head and thorax, scape short and stout, a little longer than the 3d flagellar joint, with silvery plumose hairs outwardly; pedicel and 1st flagellar joints broader than long together about as long as the 2nd flagellar joint, this shorter than third, this and following joints subequal about twice as broad as long, the flagellum more or less nodulose and *Sphecodes*-like.

Tergite 4 has a sub-basal narrow impressed line while 2 and 3 are as in the ♀.

Seventh and eighth sternites concealed and highly modified, the seventh with divergent basal struts, apically membraneous and cleft into 2 quadrate lamellae; 8th basally lamelliform apically produced into a dark narrow parallel-sided, strapshaped spine, very slightly expanded apically and rounded.

Cardo well developed about as broad as long, basal portion of stipes short, the median apical angles a little acute, apices nearly straight, the apical half outwardly with rather setose whitish hairs. Sagittae together ovate lanceolate excavated or broadly channeled above, inner margins adjacent in the basal half and then separated in a gentle curve and approximate apically.

The affinities of this genus are clearly with *Paracolletes* and they together diverge from *Colletes* by the presence of the pygidial area. Here too belong several of the genera of bees with emarginate tongues and 2 cubital cells rather than with *Hylaeus*.

DUFOUREIDAE.

23. Mimulapis n. gen.

Related to *Halictoides* but with greatly elongated mouth parts and a well developed malar space. Maxilla with the cardo nearly as long as the stipes, lacinia acuminate about two-thirds as long as the stipes, palpi about as long as the stipes, 6-jointed, basal and 2nd joint larger than the remainder, basal about half as long as the second, second a

little longer than either the 3rd or 4th, 5th and 6th successively shorter but elongate; labium with the glossa and palpi about equal in length to the mentum, paraglossae not quite attaining the apex of the first palpal joint, the palpi 4-jointed elongate, first 3 joints flattened, 4th subcylindrical, 2nd joint longest as long as 3rd and 4th together, glossa hairy acuminate, lance-linear.

Wings with two closed cubital cells, the second receiving the recurrent nervures, about 1/5 its length from either end. Stigma well developed, radial cell lanceolate, pointed on the wing margin, transverse median a little before the basal. Cubital cells subequal on the cubitus, the second narrowed in front, only about 1/3 as long on the radius as on the cubitus.

Head flattened elongate, mandibles ♀ unidentate within, labrum free large, not twice as long as broad, clypeus strongly produced, malar space 2/3 as long as wide, genae very narrow, occiput well developed, wider than the width of the eye.

Collar sloping in front not narrowed medially. Scutellum simple, propodeal area well defined, propodeum rounded abruptly down to the posterior face which is not carinate laterally.

Claws unequally cleft. Hind tibiae of female flattened with a stiff scopa on both sides, broader than the basitarsus. Legs of male more or less deformed.

♀ Antennae short, clavate only the terminal segment of the flagellum as long as broad, second and third flagellar joints ringlike, forming, with the first, a sort of funicle which tapers from the 6-jointed club. ♂ Antennae deformed, segments 1-4 of the flagellum forming a bulb-shaped structure emarginate beneath and this strongly concave under surface with a dense brush of short stiff erect brown hairs, sixth abdominal segment ♀ retracted. ♂ Abdomen deformed, last tergite with a longitudinal median area.

Type *Mimulapis versatilis* Bridwell.

Mimulapis versatilis n. sp.

Black with some chalybaeus reflections on head, thorax and abdomen above. Mandibles more or less piceous, legs and antennae brownish, tergites with the depressed margins broadly and the sternites more narrowly brownish translucent.

Rather loosely pubescent with whitish pubescence which becomes brownish or fulvous on the mandibles, labrum, clypeus, mesonotum, tibiae in part, tarsi, venter and tergites 3-5.

Clypeus convex with a few coarse scattered punctures, a fine furrow extends from between the antennae a little more than half the distance to the anterior ocellus, front and vertex closely and strongly punctured, the punctures confluent on the occiput. Mesonotum similarly punctured the furrows well defined; scutellum more sparsely punctured shining; metanotum shagreened; area of propodeum irregularly longitudinally striate basally, with a few transverse striae apically; mesopleurae more

or less irregularly punctured, smooth in part, tumid, sides and posterior face of propodeum finely shagreened, its basolateral area (undefined) finely punctate.

Abdomen ♀ ovate, 1st tergite with the surface punctate except the translucent depressed margin but not closely nor coarsely, remaining tergites with the surface obscured by oblique fine piliferous punctures and the declined hairs from them, sternites with the piliferous punctures stronger. Abdomen ♂ more elongate, tergites 1 and 2 more strongly punctate, the translucent margins of the tergites narrower, tergite 7 with a flat narrow brown longitudinal smooth area extending its entire length. Sternites 2-4 more or less emarginately depressed posteriorly, the 4th with a triangular flattened reversed tooth on either side, 5th depressed shining, arcuately emarginate behind, sixth retracted, the basal portion with a broad median longitudinal channel and fulvous hairs on either side, with an oval apical process bearing a blunt spine on its ventral side just before the apex.

The ♂ has the legs more incrassate, the anterior claws large and evenly cleft, the anterior tibiae produced into a curved flattened apical spine in the axis of the tibia, the middle tibiae are greatly subtriangularly incrassate in the middle with a much greater flattened spinous process at the end which bears a brush of peculiar hairs a little before the apex, its basitarsus expanded apically, the 3 median tarsal joints cordate (in all the tarsi), the hind tibiae widest a little beyond the middle within and bear on the inner surface beyond, (as also the basitarsi), long shining white hairs.

♂ Mandibles elongate, acute, the tooth reduced, bearing a tuft of white hairs at base. Antennae beyond the basal bulb with depressed areas, truncate at the end.

♂ Seventh sternite developed into two elongate apical parallel membraneous lobes separated by a narrow slit, with sparse whitish hairs apically, bent at the base of the slit and narrowed apically to a blunt point, with two basal struts much as in *Hylaeus;* 8th sternite with a subquadrate basal piece and an apical elongate median process strongly chitinized, irregularly prismatic with four sides, with a gentle dorsoventral sigmoid curve, produced about as far as the width of the basal piece, with two broad basal struts not so long as the apical process, parallel separated from each other by a slit nearly as broad as each strut.

Edeagus with the cardo transverse twice as broad as long a little produced medially, the stipes with the inner angle sub-basal, the outer side sinuously emarginate near the base of the sagittae, with a slender curved apical process arising near the apex of the sagittae; sagittae strongly geniculate near the base, their inner margin notched at base and then somewhat expanded, their main mass lying above the plane of the stipes and cardo, but their tips deflexed below the end of the stipes.

♀ Length 8 mm.; wing 5.5 mm.; ♂ length 9 mm; wing 5.5 mm.

Described from 4 ♀ and 8 ♂ collected in the Boreal regions of Mt. San Jacinto, Calif., at elevations of 7500-9000 ft., visiting the flowers of different species of *Mimulus*, July, 1912 (Bridwell). The flowers were of two types, one with an open throat into which the bees entered directly, while in those of the other type with the closed throat they entered sidewise on either side of the gibbous portion closing the throat.

Type ♀, allotype and paratypes in the author's collection.

24. Addendum on African Hylaeidae.

Nothylaeus Bevisi (Cockerell).

Prosopis Bevisi (Cockerell).

Ann. Durban Mus. 2:45 ♂, Natal, 1917.

Nothylaeus rubriplagiata (Cameron).

Professor Cockerell (l.c.) reports that Dr. Brauns considers *Braunsi* Alfken as synonymous with this species. Alfken has quoted Dr. Brauns as considering it identical with *N. heraldicus* Smith.

With the literature at hand I have been unable to make certain whether *N. rufipedioides* or *Junodi* has precedence.

Prosopis pernix, *sandracata*, and *gracilis* Bingham and *P. quadrilineata* and *quinquelineata* Cameron are species of *Allodape*, as has been pointed out by Meade-Waldo and Alfken.

Descriptions of New Species of Hymenopterous Parasites of Muscoid Diptera with Notes on their Habits.

BY JOHN COLBURN BRIDWELL.

The Muscoid Diptera play so large a part in the economic entomology of the Hawaiian Islands that any contribution to our knowledge of their enemies has its value. The injuries to fruits by *Ceratitis capitata*, to vegetables by *Bactrocera cucurbitae*, to meats by certain of the *Sarcophaga* species and the annoyance and disease transmission by the house fly; the injury to cattle by *Stomoxys calcitrans* and by *Haematobia serrata;* the benefits in checking the seeding of the lantana by the Agromyzid seed fly; the reduction to harmlessness of the cane borer (*Rhabdocnemis obscura*) by *Ceromasia sphenophori* and the beneficial effects of the attacks of other Tachinidae upon Lepidoptera make it desirable to extend our knowledge of their enemies, particularly since efforts have been made in the past and will doubtless be made in the future to control the worst of the pests through the importation of their enemies. Farther afield are the problems of the cherry, apple and currant fruit flies, the root maggots, the sheep maggots and the screw worms all of which at least suggest the consideration of methods of natural control.

So far as I can learn there are no known hymenopterous parasites of the eggs of Muscoid Diptera. Their enemies aside from predators appear to attack them in either the pupal or larval stages. Several Pteromalids, Chalcidids and Ichneumonoids are know to attack them only in the puparium. For the practical purpose of parasitic introduction, this group of their enemies have seemed of little importance for two reasons: 1st, because they exercise little or no discrimination in their choice of host and, 2d, because the puparia which they attack are hidden away from them and require to be searched for and found, a time consuming operation which

makes it ordinarily impossible for the parasites to reach any large percentage of them. It is the other class of enemies, those which attack the maggot stage, which give promise of being of value in practical efforts to control these pests. The insects described below are all of this type. In all of these the egg is deposited in the maggot but the host is not thereby prevented from completing its growth and forming its puparium. In all these forms the adult parasite emerges from the puparium of the host.

The African insects here described were found and studied while travelling for the Hawaiian Board of Agriculture and Forestry searching for enemies of fruit flies. My travels were interrupted at Cape Town by an attack of malarial fever and the observations upon dung fly parasites were made while recuperating there. Some insects of similar habits which have accidentally entered the Hawaiian Islands and a Japanese Ichneumonid bred by Mr. Muir similar to one of the African insects studied are here described:

ICHNEUMONIDAE, Cryptinae, Stilpnini.

1. Atractodes Muiri n. sp.

Radius arising a little beyond the middle of the stigma, areolet open at apex, eyes bare, second tergite without an impressed spiracular line.

Length 8.5 mm., wing 6.5 mm.

♀ Black; mandibles in the middle, second joint of trochanters, femora, and tibiae (basal third of hind tibiae infuscate), and 2d-5th abdominal segments rufous; wing base yellow; wing grayish hyaline, the nervure infuscate.

Head not as wide as thorax, about twice as broad as long above, nearly square as seen from in front; eyes subparallel a little divergent below; malar space longer than the width of the base of the mandible; genae broader below; mandible punctured at base with the upper tooth a little longer; clypeus a little shining, rather sparsely but definitely finely punctured, the anterior margin rounded, narrowly depressed; face more opaque, protuberent in the middle above the clypeus with strong punctures separated by about their diameter, more shining and more sparsely punctured along the sides; genae nearly bare above, shining, with some scattered punctures; front similar to the face but the punctures less impressed; vertex similar to the genae; ocelli in a low triangle, lateral ocelli about equidistant from the eye margin and from

each other; antennae 20-jointed, stout, with short pubescence, moniliform at apex (5 apical joints); scape punctured, as broad as long; fourth joint about 5 times as long as broad; fifth a little shorter; the others successively shorter to the penultimate which is a very little longer than broad; last joint ovate, a little longer.

Mesonotum shining, finely hairy, sparsely punctured; parapsidal furrows fine, rather shallow, parallel, not reaching more than half the length of the sclerite; prescutellar fovea rather deep with raised transverse lines at its bottom; scutellum subtriangular, proturberent, shining, sparsely, finely punctured; mesopleura shining, with fine scattered punctures ,the anterior and posterior marginal sulci consute. Basal area of propodeum trapezoidal with about 15 punctiform pits occupying its surface; petiolar area strongly concave, reticulate above transversely ridged below; external areas smooth basally, reticulate along the costula; dentiparal area more or less irregularly reticulate; spiracular area reticulate, the spiracles small; pleural areas transversely striate or sulcate, reticulate next the coxae.

Post petiole somewhat aciculate, the spiracles a little nearer the apex than to each other; remainder of abdomen smooth, shining and highly polished; ungues slender, elongate; subdiscoidal nerve arising from the middle of the nervellus; subdiscoidal nerve of hind wing arising far below the middle of the nervellus.

Described from one ♀ bred from the puparium of an undetermined species of *Sarcophaga* living in decaying fish used as fertilizer in the field. Okitsu, Japan, Jan. 1913. (F. Muir). Type in the author's collection.

2. Atractodes Mallyi n. sp.

Very similar to *A. Muiri*.

Mandibles entirely black; 2d joint of trochanter black; fifth segment of abdomen dark; the coloration otherwise as in *Muiri*.

Anterior margin of clypeus not depressed, a little produced in the middle, smooth and shining at apex; front and vertex very highly polished and shining, with only a few scattered minute punctures; ultimate joints of antennae not so distinctly moniliform.

Mesonotum more highly polished and shining; the parapsidal furrows more distinct, reaching farther to the rear, punctures minute, indistinct, scattered; median elevated area of metanotum trifid in front (simple in *Muiri*); sides of pronotum imperfectly striate (only the posterior margin consute in *Muiri*); basal area of propodeum transverse, irregularly rugose or shagreened.

Spiracles of first tergite about as far from each other as from the apex, post petiole less expanded.

♂ Abdomen not at all compressed, rounded at apex, tergites 2-5 rufous or all but 3d blackish. Antennae 25-jointed not all moniliform. Length 6.5 mm., wing 5.5 mm.

Described from 29 ♀♀ and 8 ♂♂ bred at Cape Town from an undetermined *Sarcophaga* living in human excrement and experimentally from other species of *Sarcophaga* living in carrion. The habits of this species were discussed under the name of *Allotypa* sp. in these Proceedings 3:492-493, 1918.

The type ♀ and allotype ♂ will be placed in the South African Museum; paratypes in the collection of the Hawaiian Board of Agriculture and Forestry, in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

Named in appreciation of Charles W. Mally, Cape Entomologist, and his works upon the biology and economics of fruit flies and the house fly including studies of their natural enemies.

BRACONIDAE, Vipioninae.

3. Microbracon Terryi n. sp.

♀ Black, mandible in the middle, sides of all the tergites (more broadly in front so that the first and second are only dark spotted discally or are entirely yellow), the ovipositor (but not the sheaths), knees, front femora apically more or less, hind tibiae basally more or less, and calcaria yellow, the pale markings suffused and their limits indefinite, mouth more or less reddish, wings and venation fuscous subhyaline.

Highly polished and shining, the second tergite feebly rugose behind the median area of the first, its anterior furrow interrupted medially about one-half the width of the median area of the first, suture of the connate second and third tergites smooth.

Antennae about 28-jointed, longer than the head and thorax. Ovipositor longer than the head, thorax, and abdomen together.

Length 3 mm., ovipositor 4 mm., wing 3.5 mm.

♂ Similar to the female, the abdomen sometimes entirely dark.

Described from 24 ♀♀ and 18 ♂♂ from the Hawaiian Islands: Honolulu (Terry, Timberlake) Oahu Sugar Co.

Plantation (Timberlake); Maui, Kipahulu (Swezey); Hawaii, Pahala (Swezey).

Bred from *Tephritis crassipes* breeding in the heads of *Bidens* by the late F. W. Terry, Honolulu, Jan. 1906, by P. H. Timberlake, Honolulu, July 1918, and by J. C. Bridwell, Wailuku, Maui, Aug. 1918.

This species is an immigrant, doubtless arriving with its host, from what country we can only conjecture. The habits of the species were studied by Mr. Terry in Jan. 1906, and Mr. Swezey's material from Maui was taken the same year. This is doubtless the *Bracon* recorded by Dr. Perkins in the introduction of the Fauna Hawaiiensis as attacking *Tephritis*.

Type ♀ and allotype ♂ in the collection of the Hawaiian Entomological Society; paratypes in the U. S. National Museum, in the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

Opiinae.

4. Opius lantanae n. sp.

♀ Length 2 mm.

Black; the legs, including coxae, palpi, clypeus and mandibles in part, scape and pedicel (and usually the first tergite and the anterior half of second) yellow; tegulae brownish; wings hyaline, the nervures brown.

Smooth and shining, highly polished except the face, which is very slightly microscopically roughened; propodeum and first tergite rugose; second tergite slightly aciculate sublaterally; the suture of the connate second and third tergites finely crenulate or almost smooth.

Head a little more than twice as broad as long; mandibles entire beneath, widely separated from the clypeus; the malar space as long as the width of the mandible; face with a rounded median ridge; clypeus not twice as broad as long; eyes oval, parallel; posterior orbits not narrowed below, narrower than the width of the eye; lateral ocelli about four times their width from the eye margin; antennae about 23-jointed, inserted above the middle of the eyes; first joint of the flagellum about three times as long as broad, second and following joints successively shorter, all as long as broad.

Mesonotum evenly convex, not impressed; parapsidal furrows indicated as deep rounded impressions at the anterior margin; mesopleural impressions imperfectly crenulate.

Stigma lanceolate; the radius arising near its basal third, first abscissa of radius less than half as long as the width of the stigma, one-fifth the length of the second, second abscissa one-half longer than the first transverse cubitus, a little less than half the length of the third abscissa; recurrent nervure joining the second cubital cell, which is five-sided.

Second tergite finely longitudinally aciculate antero-laterally; suture between the connate second and third tergites evident, usually finely crenulate, the highly polished median triangular area of second tergite separated from the lateral areas by imperfectly defined, percurrent, feebly aciculate, diverging impressions; third tergite smooth and highly polished; second and third tergites subequal in length, the third widest and three times as broad as long; ovipositor exserted, nearly one-half the length of the abdomen.

♂ The sculpture of the abdomen in the males varies greatly; some have the second and following tergites smooth, the suture of the second and third tergites not evident, not at all crenulate, while in others the entire second tergite is aciculate. Antennae 20–24-jointed, usually 22 or 23.

Described from 51 ♀ and 36 ♂ specimens bred from the Lantana-seed Agromyzid (still undetermined) by O. H. Swezey, P. H. Timberlake and J. C. Bridwell upon the island of Oahu. First bred by Mr. Swezey from material collected by him May 12, 1913.

Type ♀, allotype ♂ and paratypes in the collection of the Hawaiian Entomological Society; paratypes in the collection of the Hawaiian Sugar Planters' Association, in the U. S. National Museum, and the private collections of P. H. Timberlake and J. C. Bridwell.

This runs in Gahan's carefully elaborated tables of the North American species of *Opius* (Proc. U. S. Nat. Mus. 49: 68-72) to *Opius osciuidis* (Ashmead) known only in the male sex from material bred from an *Osciuis* breeding in the leaves of *Plantago major* at Washington, D. C. Our species differs but little in the characters given in Ashmead's description. The suture at the base of the scutellum is certainly not unate in our species, nor are the lower parts of the head (except the mandibles and the clypeus) yellow. Doubtless our species is distinct and more differences will be found when the ♀ of *osciuidis* is studied.

The present species is of very great interest from its bearing upon the control of lantana by insects, the Agromyzid attacking the seeds being one of the most significant of the insects introduced into the Hawaiian Islands from Mexico for that purpose. We must consider it almost certain that it will hereafter play a very restricted part, since recent breedings from lantana berries in Honolulu give many more parasites than flies. In the country districts of Oahu, apparently, the parasite is as yet not so numerous and it has not yet been found on the other islands.

Mr. Pemberton and Mr. Timberlake have made preliminary studies of the biology of this species, not yet published. Mr. Pemberton has found that the first stage larvae are like those found by him in the Opiine parasites of the fruit flies. Mr. Timberlake has found that this species, like some of the Opiine fruit fly parasites, may pass considerable time dormant in the larval stage. From material collected on January 12, 1918, parasites emerged from January 15 to February 6, and again in October. This period of dormancy will need to be considered in future work in the introduction of this Agromyzid into other countries, for not unfrequently material supposed to have had all the insects bred out from it may still contain parasites which may escape through negligence.

Hedylus desideratus n. sp.

Head black; clypeus and mandibles piceo-testaceous; antennae reddish infuscate; palpi, maxillae and labrum yellowish; thorax above dark rufous or piceous, the lateral lobes usually blackish; legs yellowish; abdomen yellowish-ferruginous; ovipositor sheaths black; wings hyaline, the nervures brownish.

Head broader than the thorax, about twice as broad as long above; clypeus and inner orbits with sparse white hairs and strongly punctured, more sparsely so above; vertex in front of anterior ocellus transversely irregularly rugose; genae margined above nearly to the summit of the eyes, a little broader below, with a single series of feeble punctures; malar space about as broad as long; mandibles separated from the clypeus by a narrow space, simple beneath; clypeus a little less than twice as wide as high, with a rounded process in the middle; tectiform with a median ridge; eyes roundish oval, a little divergent below; posterior

ocelli five times as far from the eye margin as the distance between them; vertex and front shining, with a few lateral punctures; antennae about 43-jointed; joints 1–4 of flagellum subequal, the remainder successively shorter, all much longer than broad.

Mesonotum with deep crenulate parapsidal furrows converging behind and meeting a little in front of the prescutellar sulcus; anterior margins of the lateral lobes with a shallow crenulate marginal furrow; mesopleura with an anterior crenulate sulcus meeting the crenulate sternopleural sulcus at right angles; prescutellar sulcus divided into 4-6 pits by carinae; propodeum reticulate-areolate, with a longitudinal median carina imperfectly indicated for its anterior third.

Abdomen smooth and shining, slightly compressed, about as long as the head and thorax together, its sides nearly parallel; first tergite about twice as long as wide at apex, with a median area limited for about two-thirds of its length from the base by carinae, smooth basally, aciculate apically; the rest of the tergites smooth and highly polished, shining, only the anterior sulcus of the second distinct, this smooth and very narrowly interrupted in the middle; connate second and third tergites about one and one-half times as long as broad, about as long as the rest of the abdomen beyond; ovipositor about as long as the head, thorax and abdomen together.

Length 3.5, ovipositor 3.5, wing 3.75 mm.

♂ similar to the ♀; apical segments of the abdomen often blackish. The apex of the abdomen is rounded, not widened to the apex and truncate as in *H. habilis*.

Described from 29 ♀ and 4 ♂ bred, with many others, from various fruit flies of the genera *Dacus* and *Ceratitis* at Oloke Meji, Ibadan Nigeria, August-November, 1914.

Type ♀, allotype ♂ and paratypes in the collection of the Hawaiian Board of Agriculture and Forestry; paratypes in the author's collection.

It is with some hesitation that this species and the following are referred to *Hedylus*, since the female of *H. habilis* Marshall is still undescribed and there is some little divergence in the abdominal characters of that species from *desideratus*, *clypeatus* and *Giffardi* Silvestri. The stigma is broadly lanceolate; the first abscissa of the radius is about one-half the length of the second; the cubitus is continued beyond the second cubital cell the discoidal cells are completely closed. The parapsidal furrows are stronger and crenulate in the African species and the petiole is by no means sublinear. However, they

agree in the two extremely important characters of the long maxillary palpi and the short second abscissa of the radius.

In *H. Giffardi* the second tergite is striate back to the sulcus, differing in that respect from *habilis* and *desideratus*.

This species resembles very closely *Biosteres caudatus* Szepligeti from the same region, but differs by the longer maxillary palpi, the more elongate stigma with the radius arising distinctly beyond the middle and by the structure of the prescutellar sulcus.

This species was by far the most numerous in individuals of the fruit fly parasites bred at Oloke Meji and attacked a greater number of host insects and in a greater variety of fruits than any others. It was carried in a living condition to South Africa, but was unfortunately lost during the time the author was confined in a hospital there.

Like *Diachasma Tryoni* Cameron, *D. Fullawayi* and *Opius lantanae*, this species may pass a considerable period dormant in the last larval instar.

6. Hedylus clypeatus n. sp.

♀ Resembles *H. desideratus*, but the mandibles are flattened and expanded basally; the clypeus has a semicircular impression at apex; the clypeus is a little produced in the middle above the impression and at either side of it, giving a somewhat tridentate appearance, it is somewhat tectiform about twice as wide as long; the facial ridge is flattened and shining and the face is more strongly punctured than in *desideratus*; the (true) metanotum is dentate in the middle and the first tergite is nearly smooth and shining, the thorax above is rufo-testaceous. The antennae of the unique specimen are missing.

Described from 1 ♀ specimen taken at Oloke Meji, Nigeria, July 27, 1914, upon the fruit of an unknown vine, which it was examining apparently with the intention of ovipositing. These fruits contained fruit fly larvae, which unfortunately failed to breed out, and no more were obtained.

Type in the collection of the Hawaiian Board of Agriculture and Forestry.

This species might be considered to run to *Sudylus* Buysson in Gahan's table of the genera of *Opiinae* (l.c. 66-67), but the maxillary palpi in that genus are said to be short and three-jointed. It is certainly, in my judgment, congeneric with the other African species described as *Hedylus*.

Alysiinae.

7. Alysia lusoriae n. sp.

Length 6 mm., wing 4.75 mm. to 5 mm.

Rufo-testaceous, highly polished and shining; tips of mandibles, antennae from the third joint, eyes, ocelli, last joint of front tarsi, middle tarsi, sheaths of ovipositor and wing venation black or infuscate; 9–15 joints from the apex of antennae white; clypeus and mandibles, except apex, and palpi pale testaceous; wings subhyaline.

Head broader than the thorax; maxillary palpi 6-jointed, reaching the apex of the front coxae; labial palpi 4-jointed, a little longer than the three basal joints of the maxillary palpi; clypeus produced from its base, almost fusiform, somewhat tectiform, the apex a little rounded; face above the clypeus a little rugose, not distinctly ridged, hirsute, consute at the sides beneath the antennae; a consute or crenulate transverse furrow between the antennae; posterior ocelli in front of a line connecting the summit of the eyes, about four times as far from the eye margin and the occiput as from each other, connected by a furrow with the occiput, eyes orbicular, separated in front by about four times their apparent width; genae about as wide as the eye seen from the side; antennae 33-jointed, third joint shorter than fourth, the remainder successively shorter, but all longer than broad.

Thorax broader than the abdomen; parapsidal furrows strong, crenulate, converging behind and meeting before the prescutellar sulcus, antero middle portion parallel, abruptly directed outwardly in front, joining the crenulate marginal furrow of the lateral lobes, median lobe strongly declivous anteriorly, not arched transversely in front; prescutellar sulcus large, about twice as broad as long, divided in the middle by a straight fine carina and laterally by some three or four irregular ones or subreticulate; the lateral pits of the scutellum with longitudinal carinae or striae; metanotum laterally crenulate projecting in a trifid costate-carinate mass in the middle; sides of pronotum consute; an oblique subvertical consute impression not joining the longitudinal sulcus on the mesopleurae, the longitudinal sulcus abruptly narrowed in front and more gradually behind, broad with many transverse lines or carinae; median ventral line of mesothorax crenulate; propodeum areolate, a median carina at base more or less interrupted at the beginning of the declivity and continued as two carinae below, some transverse broken carinae at the declivity and an irregular transverse costate carina above the insertion of the abdomen; the spiracles small and circular.

Nervulus nearly its own length beyond the basal; the recurrent joining the second cubital cell, the latter therefore five-sided: radius originating beyond the middle of the broadly oblanceolate stigma, its abscissae angulate on each other, the second more than twice as long as the first, shorter than the first transverse cubitus, radial cell barely falling short of the extreme apex of the wing; second cu. cell not noticably narrowed apically, the second transverse cubitus distinctly indicated but obsolescent; subdiscoidal nervure interstitial; hind wings with a *post nervellus* (as Gahan uses the term), the submedian cell more than one-third and less than half the length of the median.

Abdomen fusiform, nearly three times as long as broad, first tergite less than twice as long as broad at apex, longitudinally sulcate with carinate margins, a median area indicated on the basal two-thirds by strong longitudinal carinae; the median area has some irregular transverse carinae basally and a median longitudinal one subapically to which some oblique carinae converge, remainder of abdomen smooth; sulcus of first suture fine narrowed in the middle but scarcely interrupted; fused second and third tergites with the suture scarcely indicated, longer than broad, nearly half the length of the abdomen; ovipositor nearly as long as the head, thorax and abdomen together.

Described from 34 ♀ collected at Fish Hoek, Simon's Bay, near Cape Town, upon cow droppings or bred from the puparia of *Musca lusoria*, breeding in cow dung there, April, 1914 (Bridwell). No males were seen or bred.

The eggs of *Musca lusoria* are deposited scattered on the surface of fresh cow droppings and hatch within a few hours; the larvae reach full growth in about five days and enter the earth to pupate. The eggs of *Alysia lusoriae* are deposited in the larvae apparently on the second day and the adults emerge from the puparia.

In Ashmead's tables* this species might be considered to run to *Asyntactus* Marshall, but in that genus the second tergite is punctured and opaque. However, if we consider the second transverse cubitus as distinct, and it is distinctly indicated though obsolescent, it would run to *Goniarcha* Foerster. The type species of this Foersterian genus is *Alysia lucicola* Haliday, from which this species differs, aside from color, in the much longer ovipositor, the subdiscoidal nervure being interstitial, and in the shorter first tergite.

* Proc. U. S. Nat. Mus. 23:104, 1900.

In Marshall's table† it runs to *Idiasta* Foerster, but the second cubital cell cannot be said to be quadrangular, nor the radial cell lanceolate; the recurrent is received by the second cubital cell and the subdiscoidal nervure is interstitial. The ovipositor is much longer.

In Szepligeti's table‡ it runs to *Alysia*, section *Goniarcha*. Pending a thorough revision of the genera of the Alysiinae I have considered it as well to describe this species under *Alysia*.

The type will be deposited in the South African Museum at Capetown. Paratypes in the collection of the Hawaiian Board of Agriculture and Forestry and in the author's collection.

8. Aphaereta sarcophagae n. sp.

♀ ♂ Very much like *A. muscae* Ashmead as represented in the Hawaiian Islands, but with the prescutellar sulcus more profound, smooth with a single median raised line at the bottom of the sulcus; the surface of the propodeum below the transverse carinae usually less rugose than in *muscae;* sculpture of the first tergite exceedingly variable, but the segment seems to be always shorter, more triangular, the spiracles less prominent and the sublateral carinae more convergent posteriorly, and the second tergite has the sides more divergent behind.

This species, so far as the material before me goes, averages considerably larger than *muscae*, with the number of antennal joints averaging less. In both species they vary from 19–23. The largest ♀ is about 3.5 mm., while the smallest is only about 1.75 mm.

Described from 82 ♀ ♀ and 22 ♂ ♂ bred with many others from an undetermined *Sarcophaga* breeding in human excrement at Fish Hoek, on Simon's Bay, near Capetown, in April and subsequently on board ship in May and June from the same material.

Types ♀ and allotype ♂ and paratypes in the South African Museum; paratypes in the collection of the Hawaiian Board of Agriculture and Forestry and in the private collection of P. H. Timberlake and of the author.

† Tr. Ent. Soc. Lond. 1894:499-500.

‡ Gen. Jus. Braconidae. 200-202, 1904.

The larvae of the *Sarcophaga* are deposited and the *Aphaereta* oviposits in them the same day, the adults emerging from the puparia which form after the larvae have buried themselves in the ground. Several individuals of the *Aphaereta* emerge from a single puparium.

Ashmead described *muscae* as without a longitudinal median impressed line on hte occiput behind the ocelli, but in the form found in the Hawaiian Islands such a line is present.

The European *A. minor* is described as having no sulcus at the base of the scutellum. It is singular that the South African species should resemble the North American species so much more slosely than the European.

In this connection it may be well to record definitely that *A. muscae* in the Hawaiian Islands attacks *Sarcophaga pallinervis* Thompson, a species known only as breeding is cow dung. It has been repeatedly bred from this host by Mr. Swezey and Mr. Timberlake.

CYNIPIDAE, Eucoilinae.

9. Bothrochacis stercoraria n. sp.

♀. Black, highly polished and shining; mandibles in the middle, antennae, legs and abdomen dark rufous; the wings brownish yellow fading to hyaline in the radial cell and below, apically. Antennae 13-jointed, the seven apical joints larger, moniliform; third joint longer than fourth, twice as long as broad; pedicel globular; scape pyriform.

Pronotum truncate in front; collar costate, the carina emarginate in the middle; three or four longitudinal radiating striae in the superior angle of the side of the pronotum where it joins the collar carina; below this is a dense brush of fulvous hairs as in *Eucoila;* mesopleura as in *Eucoila;* mesonotum entirely without furrows, ridges or punctures; fovea of the base of the scutellum divided by the carina at the base of the cupuliferous elevation, the cupule on the posterior face of the elevation; back of the fovea is a small oval shallow impression on either side. Second tergite with a ring of dense pubescence at base.

Wings with median, transverse median, basal and radial veins fully developed; brown; second abscissa of radius straight, at right angles with the first; from the angle of the radius obscure vestiges of veins extend in a curve apically and basally. The radial cell is open about its apical two-thirds on the wing margin, wings entirely without pubescence, apical margin entire and rounded. Length 3.5 mm., wing 3 mm.

♂. Similar to ♀; antennae nearly as long as the body, 15-jointed, a little more slender apically, the joints beyond the fourth subequal in length, the fifth about three times as long as wide; third and fourth a little shorter, subequal.

Described from 10 ♀♀ and 2 ♂♂ from cow dung in the vicinity of Capetown, April, 1915, or bred from the puparia of *Musca lusoria* and *Lasiopyrellia cyanea*. (Bridwell.)

The *Lasiopyrellia*, like the *Musca*, breeds in cow dung and emerges to pupate in the soil. They feed in colonies in the more putrescent portions of the dung and scatter when ready to emerge. The *Bothrochacis* enters the dung through interstices and attacks the full-fed larvae ready to emerge from the dung.

Type and allotype is the South African Museum: paratypes in the collection of the Hawaiian Board of Agriculture and Forestry and in the authors' collection.

From the description I was at first inclined to identify this with *Bothrochacis erythropoda* Cameron (Albany Museum Records 1:164 ♂, 1904), also from the Cape, but the radius of that species is said to have the second abscissa roundly curved.

In Kieffer's tables (Gen. Ins. Cynipidae 1902), this species would run to *Lytosema*, but Cameron's genus seems to differ from Kieffer's by the position of the cupule.

This species does not appear to be able to parasitize any great percentage of the larvae of its hosts, since its movements are slow and uncertain.

Notes on Halictidae (Hymenoptera).*

BY J. C. BRIDWELL.

NOTES AND EXHIBITIONS.

Nesolocus giffardi.—Mr. Bridwell exhibited a piece of wood of the tree, *Cheirodendron gaudichaudii*, collected on the Kammuahona Trail, showing the work of the larvae of this strange Curculionid and its characteristic pupal cell in the wood, and also gave some of the insect's habits.

Dolichurus stantoni.—Mr. Williams reported the finding of this recently-introduced roach parasite on Lanihuli Ridge at 2000 feet elevation, and stated that he had also observed it on the flat behind Tantalus.

Crabro tumidoventris.—Mr. Williams reported finding a nest of this wasp on Sugar-Loaf Hill back of Honolulu which contained specimens of the Mediterranean fruit-fly, *Ceratitis capitata*.

Psyllidae.—Mr. Crawford offered some notes on Psyllids, stating that he was monographing the Psyllidae of the South Pacific, including the Hawaiian species.

Samoan Insects.—Mr. Giffard exhibited another consignment of insects from American Samoa, this being the third lot received during the past few months. These insects were collected at the instance of Mr. Giffard by Dr. H. C. Kellers, U. S. N., and transmitted through Mr. Poyer, Governor of American Samoa. The collection as a whole included 1659 specimens and approximately 267 species, distributed by Orders as follows: Hymenoptera, 99 specimens, 25 species; Diptera, 56 specimens, 22 species; Lepidoptera, 149 specimens, 42 species; Coleoptera, 409 specimens, 83 species; Homoptera, 645 specimens, 38 species; Heteroptera, 186 specimens, 29 species; Orthoptera, 93 specimens, 20 species; Odo-

* Withdrawn for publication elsewhere.—[Ed.]

nata, 10 specimens, 5 species; Neuroptera, 12 specimens, 3 species.

In the collection, the following 25 species* have been noted which also occur in Hawaii: Hymenoptera—*Apis mellifera* L., *Polistes hebraeus* Fab., *Pison hospes* Sm., *Pison iridipennis* Sm., *Evania appendigaster* (L.), *Evania sericea* Cam., *Ischiogonus palliatus* (Cam.), *Encyrtus infelix* Emb. Diptera—*Stegomyia scutellaris* (Walk.). *Gnamptopsilopus paiellifer* Thoms., *Chiromyia (Scyphella) flava* L. Lepidoptera—*Anosia crippus* Cram., *Plusia chalcites* Esp., *Stoeberhinus testaceus* Butl. Coleoptera—*Necrobia rufipes* Fab., *Araecerus fasciculatus* (De Geer), *Rhabdocnemis obscura* (Boisd.). Heteroptera—*Geotomus pygmaeus* Dallas, *Reduviolus capsiformis* (Germ.), Orthoptera—*Gryllus oceanicus* Le Guill, *Periplaneta australasiae* Fab., *Leucophaea surinamensis* Fab., *Phyllodromia notulata* (Stal.), *P. oblusata* Brunn., *Chelisoches morio* (Fab.).

Kilauea Insects.—Mr. Giffard exhibited a collection of insects made by him at Kilauea last summer.

Clerada apicicornis.—Mr. Ehrhorn reported finding this predacious bug in a pigeon's nest after the nest had been vacant for six months.

Acalles sp.—Mr. Ehrhorn exhibited a specimen of this genus of Curculionid beetles found in decaying wood.

Jassid on Amaranth.—Mr. Swezey reported finding on *Amarantus spinosus* growing by the roadside in Makiki Valley, the same Jassid exhibited by Mr. Ehrhorn at the previous meeting.

Cryptophlebia illepida in macadamia nut.—Mr. Swezey exhibited a specimen of this Tortricid moth bred from a macadamia nut. Several of the nuts were brought in by Mr. Higgins, November 19th, from Mr. Jordan's place on Wyllie street. The outer husk of the nut was being eaten by lepidopterous larvae feeding between it and the nut, in some cases

* The determinations of these species were made by Messrs. Swezey, Bridwell and Timberlake.—[Ed.]

eating the nut somewhat also. Two of the moths were reared. This is another addition to the host plants of this moth. It feeds mostly in pods of *Acacia farnesiana* and *Acacia koa*, but has also been found in lima beans, Sapindus seeds, litchi nuts, and in the pulp of mangoes.

Tenodera sinensis.—Mr. Swezey reported for Professor Bryan that one of his former boy scouts had brought him a specimen of the praying mantis, collected at Waikiki. Several times the young mantids have been liberated in Honolulu as they hatched from egg masses brought from Hawaii, but no adults have been previously collected here.

Termites in telephone poles.—Mr. Swezey reported that in examining telephone and electric light poles broken down in the recent severe wind storm, many of them were found to be badly eaten by termites. Three species were found: *Calotermes marginipennis*, *Cryptotermes* sp. and *Coptotermes gestroi*. The latter when present was the most destructive, eating out the heart of a pole below the surface of the ground and forming immense colonies. *Cryptotermes* was found to have eaten from bottom to top of a 20-foot pole that had been up only five years. They fed chiefly in the outer part of the pole.

ANNUAL ADDRESS.*

Observations on the Sources of Hawaiian Encyrtidae (Hymenoptera).

BY P. H. TIMBERLAKE.

In 1901 when Ashmead published his descriptions of the Hymenoptera Parasitica of the Hawaiian Islands in the Fauna Hawaiiensis, Vol. 1, Pt. 3, only five species of Encyrtidae[1] were known to occur in these Islands. Of these one species was described by Cameron in 1886 from a specimen collected by Blackburn. This species, *Encyrtus insularis*, belonging apparently to the new genus *Bothriencyrtus*,[2] has not been found since and is presumably an immigrant species that failed to become established. Two other species described as new are apparently endemic and may be known in the future as *Echthrogonatopus molokaiensis* and *Nesencyrtus kadae*, having been wrongly referred by Ashmead to *Microterys* and *Adelencyrtus* respectively. The fourth species is considered to be the common *Encyrtus infelix* (Embleton) incorrectly identified by Ashmead as *Encyrtus fuscus* (Howard) and now known to be nearly cosmopolitan. A fifth species not mentioned by Ashmead was described in 1898 by Dr. Howard as *Blepyrus marsdeni*, and which I have recently synonymized with *Blepyrus mexicanus* Howard.

In 1907 Mr. Swezey published his observations and figure of a small Encyrtid, under the name of *Ageniaspis* species, which he found parasitizing the larvae of *Odynerus nigripennis*

*The President being absent in Army service, the Vice-President gave the Annual Address.—[Ed.]

[1] In the sense used here the Encyrtidae include only the group known as the Encyrtinae by most modern writers, to the exclusion of the Eupelmidae, Signiphoridae and Aphelinidae which have been associated with the Encyrtidae by some authorities.

[2] The new genera and species mentioned will be described in an appendix to this paper.

(Holmgren).[3] This and another very similar species, both apparently endemic, may be known as *Coelopencyrtus swezeyi* and *odyneri* Timberlake.

In his supplement to the Hymenoptera of the Fauna Hawaiiensis, Vol. 2, Pt. 6, published nine years after the appearance of Ashmead's work, Dr. Perkins added nine species to the list, and in 1912 described *Echthrogonatopus hawaiiensis* as a new endemic species.[4]

During the following year, 1913, Mr. Fullaway described three new species from these Islands and records about five other unnamed species which had not been noted previously.[5] In 1914 he recorded still another species taken on Laysan Island under the name of *Ectroma* species.[6] This proves to be a *Xanthoencyrtus*, closely allied to two other species taken on Oahu, and will be described later as *X. laysanensis*. One of Fullaway's species, *Apentelicus kotinskyi*, proves to be the male of the species previously recorded under the name of *Microterys flavus*, and as there are slight but constant differences to separate it from Howard's species, it may be known hereafter as *Microterys kotinskyi* (Fullaway). It is possible that the true *flavus* is also established in the Islands, as I have seen a pair collected by Koebele on Hawaii. Mr. Fullaway also confused two species under his *Aphycus terryi*, one of which I have made the type of the genus, *Pseudococcobius*. His supposed male of *terryi* proves to be another species of *Xanthoencyrtus* which may be known as *X. fullawayi* Timberlake. With these corrections we find that twenty-five species of Encyrtidae have been recorded from the Islands up to the present time. In the last few years several other species have been collected or identified from earlier material so that now some forty-odd species are known to occur, or at least to have been collected here once, since the list includes two immigrant or

[3] Hawaiian Sugar Planters' Experiment Station, Ent. Bull. 5, p. 52, pl. 6, fig. 6.

[4] Hawaiian Sugar Planters' Experiment Station, Ent. Bull. 11, p. 17.

[5] Ann. Rep. Hawaii Agric. Experiment Station, for 1912, pp. 26-28; and Proc. Haw. Ent. Soc., Vol. 2, No. 5, p. 281.

[6] Proc. Hawaiian Ent. Soc., Vol. 3, No. 1, p. 21.

introduced species and possibly three or four which apparently failed to become established.[7]

Sources of the Hawaiian Encyrtidae.

The family is represented in the endemic fauna by species belonging in at least five genera, of which *Anagyrus* Howard has about a dozen to fifteen species falling in a rather distinct group almost worthy of generic distinction. *Xanthoencyrtus* Ashmead has three or possibly more species, none of them having been hithertofore described and only one recorded under the name of *Ectroma* species. *Echthrogonatopus* Perkins has at least three species, *E. hawaiiensis* Perkins, *E. molokaiensis* (Ashmead) and one undescribed. The two remaining genera are represented by one or two species each, and are of unusual interest because of the structural peculiarities in the male sex. The first of these interesting and probably wholly endemic genera is *Coelopencyrtus* Timberlake with two species parasitic in the larvae of *Odynerus*, one of which as already stated Mr. Swezey has noted and figured under the name of *Ageniaspis* species. The other genus and species is *Nesencyrtus kaalae* (Ashmead), of which Dr. Williams has reared a large series from the larvae of *Nesoprosopis pubescens* Perkins taken from an old rotten log near the Volcano House at Kilauea, Hawaii, in February, 1918.

The immigrant and introduced species belong in about twenty genera and have come mostly from the Oriental and Australian regions apparently, although at least three were introduced from North America, these being *Helegonatopus pseudophanes* Perkins, *Savonotum americanum* Perkins and *Aphidencyrtus schizoneurae* (Ashmead). Cameron's species *Bothriencyrtus insularis* is of uncertain origin although judging by the descripttion it seems to be an ally of *Bothriencyrtus planiformis* (Howard) of California, which is the type of this new genus.

[7] These four species are *Bothriencyrtus insularis* (Cameron), *Homalotylus flaminius* (Dalman), *Microterys flavus* (Howard) and *Comperiella bifasciata* Howard.

The following species are assumed to have come from the Oriental, Polynesian or Australian regions, judging from their known distribution, the range of their closest allies, or the distribution of their hosts or food-plants of the hosts. *Blepyrus mexicanus* Howard, although described originally from Mexico, Texas and the Hawaiian Islands, I have seen from Manila, Philippine Islands, and Mr. P. Van der Goot has informed me that it also occurs in Java. Its host, *Pseudococcus virgatus* (Cockerell) is known from Mauritius, Ceylon, India and the Philippine Islands and undoubtedly has a wide range throughout the Orient, whence it was probably introduced together with its parasite into the Hawaiian Islands as well as into the warmer parts of America.

Pauridia peregrina Timberlake, a somewhat close ally of *Blepyrus*, is the species recorded by Mr. Fullaway under the names of *Anagyrus* species and *Encyrtus* species parasitic on "*Pseudococcus citri*." I have studied specimens of this species collected at Amoy, China, by Mr. C. P. Clausen, in Fiji by Mr. Muir, in California by Mr. H. S. Smith, and have also seen the characteristic wing mounted on a slide with another Encyrtid from Manila, Philippine Islands. Its host, *Pseudococcus krauhniae* (Kuwana)[8] was described from Japan and is presumably of Oriental origin. This parasite may have been brought in with its host from the Orient years ago, or possibly it was introduced from China by Compere in about 1908.

Tanaomastix abnormis (Girault) was first introduced and liberated in large numbers about Honolulu during the winter of 1915-1916, and additional colonies were turned out later. Its establishment was considered doubtful for a time because of the usual scarcity of its regular host, *Pseudococcus krauhniae* (Kuwana). Recently, however, it has shown its adaptability to local conditions, as Mr. Rosa has reared a few specimens

[8] This is the species referred to in the literature on Hawaiian Coccidae as *Pseudococcus citri*, but I have recently discovered that our species is really *P. krauhniae* (Kuwana), in accordance with the distinctions brought out by Ferris (The California Species of Mealy Bugs, Stanford University Publications, University Series, 1918, p. 37, 45, pl. 1, fig. 8).

from *Pseudococcus virgatus* (Cockerell), collected in November, 1918, on the grounds of the Sugar Planters' Experiment Station. The species has thus become established from material received from California, whither it was brought originally from Sicily. It seems doubtful that the species is endemic in southern Europe, however, for its present known distribution is becoming cosmopolitan. Mr. J. R. Horton has informed me by word of mouth that the species occurred in Louisiana before its introduction into California (the determination, I believe, being by Mr. Girault), and I have previously recorded the species from Okitsu, Japan. It is now my good fortune to be able to add Brisbane, Queensland, to its known distribution, from specimens collected by the late E. J. Vosler. On the whole, therefore, I am inclined to believe in its Oriental, or possibly Australian origin, instead of South European.

Encyrtus infelix (Embleton) is now known to be widely distributed over the world and probably has followed its host, *Saissetia hemisphaerica* (Targioni Tozzetti), into most regions where the latter has penetrated. It would be impossible now to point out the original home of either the parasite or its host with exactitude, yet I believe this must have lain somewhere in the tropics of the Old World and probably in the Asiatic region. In addition to the localities recorded in the last number of our Proceedings from which I have seen this species, I have identified the species since from Rewa, Fiji (F. Muir); Brisbane, Queensland (E. J. Vosler); Tutuila, Samoa, near center of island (H. C. Kellers); and Manila, Philippine Islands (Geo. Compere).

A second species of *Encyrtus*, very closely allied to *E. bicolor* (Howard) but distinct in its much darker coloration and longer beard on the cheeks, has been present in the local collections for several years. This species, which may be known as *Encyrtus barbatus* Timberlake was collected in Honolulu by Alexander Craw in March, 1905, his specimens having been reared from *Saissetia hemisphaerica* on ferns, and more

recently Mr. Fullaway has reared a series from *Saissetia nigra* (Nietner) on ferns at Honolulu. *Barbatus* has been collected also by Mr. Muir at Pekalongan, Java, and on Larat, and by Compere at Manila, so that it presumably was brought here from some part of the Oriental or Indo-Malayan region.

In the collection of the Board of Agriculture and Forestry there is a single specimen of *Homalotylus flaminius* (Dalman) collected years ago on the Island of Oahu by Koebele. In a revision of the species of *Homalotylus*, which I hope will be published soon in the Proceedings of the U. S. National Museum, I have referred all forms of the *flaminius* type from Europe, Africa, Asia, and Australia to one species, to which our local specimen belongs rather than to the North American species. It is therefore likely that the species was an accidental introduction from the Orient or Australia, and as it has not been found in recent years it apparently failed to become established.

Quaylea aliena Timberlake is another species which I believe originated in the Old World and possibly in Australia. It is very closely related to a species common in California which has been described recently by Mr. Girault as *Cerchysius whittieri* and which is the type of my new genus *Quaylea*. *Quaylea whittieri* is the same species, I am almost positive, which Ashmead called *Hemencyrtus crawii* but did not describe, although it has been mentioned in the literature several times under that name by Isaac, Berlese and Silvestri; and under the name of *Cerchysius* species by Prof. H. J. Quayle and myself. If, as I suppose, it is the *Hemencyrtus crawii* mentioned by Berlese and other writers it was purposely introduced into California from Australia as a parasite of the black scale, *Saissetia oleae* (Bernard), although it has since proved to be a hyperparasite. Our local species, being closely allied and having the same habits, probably also came from Australia or some part of the Orient. It was recorded by Fullaway in 1913 as *Hemencyrtus* species, and possibly also under the name of *Encyrtus* species on *Saissetia hemisphaerica* and *Coccus*

viridis (Green). It has been reared at Honolulu from several Coccids as a parasite of *Scutellista cyanea* Motschulsky and *Tomocera californica* Howard.

Among our immigrant Encyrtids are two species of *Aphycus* which have escaped being recorded hitherto. The most common species is *Aphycus alberti* Howard, which was described from Sydney, New South Wales, and has since been recorded from Southern California. As it is parasitic in the widely distributed *Coccus hesperidum* Linné, and in closely allied species, it presumably has a much wider distribution than is known at present, and its place of origin will hardly ever be determined exactly. Without much question, however, it originated somewhere in the warmer regions of the Old World and not necessarily in Australia, whither it may have been introduced as well as into these Islands and California. *Alberti* has been found here only recently, as apparently the first specimen was reared by Mr. Swezey from *Coccus longulus* (Douglas) on velvet bean from the Experiment Station grounds in October, 1914. The other species is *Aphycus clavicornis* Timberlake, described from Auckland, New Zealand. Nothing is known of the habits of this species but as it is a close ally of *alberti* it may have similar habits. The local record is based on a pair of specimens collected by the writer on a side spur of the main ridge leading up to Mt. Lanihuli, Oahu, on September 3, 1916. Three specimens were seen running about on a slender withe of a species of *Kadua*, one of which leaped away before it could be captured. The *Kadua* twig and surrounding shrubbery were carefully examined for the host of these parasites, but no coccids of any kind were discovered.

Microterys kotinskyi (Fullaway) and *M. flavus* (Howard) are species of almost certain Oriental origin. *Kotinskyi* is very closely allied to *flavus* which has been recorded from Ceylon and which I have seen also from Japan, as well as other species nearly identical from Fiji and the Philippine Islands. Our collections of *Microterys* from those parts of the world,

however, are much too meager to shed much light on the distribution, interrelationships and possible intergradations of the species or forms allied to *flavus*.

Aphycomorpha araucariae Timberlake was reared first in July, 1906, by Mr. Kotinsky from *Eriococcus araucariae* Maskell collected on the grounds of the Board of Agriculture and Forestry at Honolulu, his rearing being represented by four broken specimens. More recently Mr. Fullaway has reared a small series from the same locality and host, and I obtained a few specimens from the Moanalua Gardens in May, 1918. As the host and food-plant of the host in this case are both of Australian or New Zealand origin there can be but little doubt that the parasite also was derived from that part of the world

Comperiella bifasciata Howard was introduced at Honolulu in 1908 from the Orient, presumably from China, as noted by Kotinsky in the Hawaiian Forester and Agriculturist, Vol. 5, p. 148, July, 1908. A single specimen, however, was reared before that time in August, 1905, by Kotinsky from an *Aspidiotus* on *Bombax ceiba*. The species has never been taken since and its establishment here is therefore doubtful. It was recorded by Fullaway as *Ceraptevocerus* species on *Aspidiotus*.

Aniecetus annulatus Timberlake has been established in the Islands apparently for a considerable period of years, as it is widely distributed on Oahu and Kauai. It is nevertheless rarely taken and the specimens in the local collections are few in number. The earliest specimen that I have seen was reared by Mr. Fullaway, April 25, 1912, supposedly from *Saissetia hemisphaerica* (Targ.), but this host record is probably incorrect as all the subsequent reared specimens have come from *Eucalymnatus tessellatus* (Signoret). I hardly question the Oriental origin of *annulatus* although no specimens from that part of the world have come to hand. The genus, moreover, seems to have originated in the warmer parts of the Old World, as the three species described previously by Howard and Girault were collected in Ceylon, China and Queensland respectively.

There are also two species of Encyrtidae parasitic on *Pseudococcus saccharifolii* (Green) in the Islands, which were almost unquestionably brought in with their host. Neither of these parasites have been found elsewhere, but as their host has a known distribution in India it seems likely that both Coccid and parasites were introduced in importations of sugarcane from some part of the Orient. The more abundant one of these parasites, *Pseudococcobius terryi* (Fullaway), has been found on Hawaii, Maui and Oahu and probably occurs on Kauai, as it is apparently distributed throughout the Islands wherever its host is found. The other parasite, *Xanthocneyrtus fullawayi* Timberlake, is much rarer, and I have seen only two female specimens. One of these, which may have been the type of Fullaway's description of the supposed male of *terryi*, was found in a vial without data together with specimens of *terryi*. The second specimen was reared from material of its host collected by Mr. Swezey in August, 1916, at Pahala, Hawaii.

Adelencyrtus odonaspidis Fullaway is a species of which we have no direct clew as to its place of origin. Its host, *Odonaspis ruthae* Kotinsky, has not been found elsewhere, but its food-plant, *Cynodon dactylon*, is known to be indigenous in the warmer parts of Europe and Asia although now spread throughout the world. It is quite possible, therefore, that both host and parasite may some time be traced back to some part of the Orient, although they may have reached the Islands from some intermediate station.

Concerning the origin of at least two other species of our Encyrtidae we have as yet even less knowledge. *Anagyrus*, which is represented in the endemic fauna, has also one or possibly two, introduced species. One of these, the large brown species with black antennae, which may be known as *Anagyrus nigricornis* Timberlake, does not seem to have been recorded hithertofore. It is widely spread on Oahu in both the lowlands and mountains, and I have seen specimens from Kauai. It has therefore been in the Islands for a considerable number of

years, although the earliest specimen I have seen was taken by Mr. Swezey as late as March, 1910. The species undoubtedly has a wide range of hosts, and probably parasitizes many of our endemic species of mealy bugs. I have reared it from *Pseudococcus gallicola* and *montanus* Ehrhorn, and have found it associated with *Trionymus insularis* Ehrhorn. I have also reared it experimentally from the introduced *Pseudococcus longispinus* (Targioni Tozzetti) and *P. lounsburyi* Brain, and in the Board of Agriculture and Forestry collection is a series of specimens reared by Mr. L. V. Lewis from *Ripersia palmarum* Ehrhorn. Perkins in his supplement to the Hymenoptera of the Fauna Hawaiiensis claims that one or two species of *Anagyrus* were introduced by Koebele but gives no particulars as to the time of introduction or the source of the material. *Nigricornis*, therefore, possibly may have been introduced by Koebele although we have no definite proof in the shape of preserved material or written records. I have seen a similar, closely allied species collected by Mr. Muir in Fiji, which is the only clew to the origin of *nigricornis* that I can suggest.

In 1913 Mr. Fullaway recorded another species of *Anagyrus* as *Encyrtus* species with banded antennae which I have named *Anagyrus swezeyi*. His host record, however, is incorrect, as this species is parasitic only in *Trionymus insularis* Ehrhorn so far as known, and there is no possibility of its being parasitic in *Saissetia*. This parasite is common through the lowlands of Oahu, and I have seen specimens from Lihue, Kauai, and Lupe Ditch, Maui. Most likely it is present also on the other large Islands, as no effort has been made to discover its distribution outside of Oahu. I am inclined to believe that it has been present in the Islands for many years and it may possibly be endemic since it is much more closely allied to the unquestionably endemic species of *Anagyrus* than is *nigricornis*, and resembles them in many particulars.

Means of Introduction of Immigrant Species of Encyrtidae.

There are published records of the intentional introduction of only two of our Hawaiian Encyrtidae, namely *Tanaomastix abnormis* (Girault) and *Comperiella bifasciata* Howard, the latter of which was found here before its liberation but has not been seen since. The introduction of *Paracopidosomopsis truncatella* (Dalman), and a *Chalcaspis* species has been reported upon also by Koebele and Craw, but neither of these parasites has been recovered. It is probable that *Anagyrus nigricornis* Timberlake was introduced by Koebele, and *Pauridia peregrina* Timberlake may have been brought from China by Compere although we have no definite information on these introductions. As far as we actually know none of our other Encyrtids was intentionally introduced, and probably most of them arrived in importations of plants before the days of strict quarantine. *Aphidencyrtus schizoneurae* (Ashmead) might have been brought in importations of cabbage or other vegetables from California, and in fact Mr. Fullaway has informed me that several of our Aphidid parasites and hyperparasites were intentionally allowed to escape from material received here in such a manner. Two others of our Encyrtidae, *Helegonatopus pseudophanes* Perkins and *Saronotum americanum* Perkins, which are parasites of Dryinidae, were probably either accidentally or perhaps intentionally liberated, through ignorance of their true nature, from material sent to Honolulu from Ohio by Koebele in 1903. They are both known to have been reared at Honolulu from the Ohio material, and as they appeared in the cane fields a few years later it seems probable that they were introduced at that time.

Aids in the Establishment of Immigrant Species of Encyrtidae.

When an emigrant species of parasite reaches a new region it is of course a prerequisite for its establishment that it finds its customary host or one related closely enough to act as a substitute. All Encyrtidae so far as known are internal

parasites,[9] and some are notable for the peculiar adaptations to their host during their larval life. The habits of species throughout the whole family may in fact be considered highly specialized in regard to their host relationships. Many species indeed so far as we know seem to be confined exclusively to one species of host and may be called monoxenotic in habit. Others are known to attack and successfully parasitize two or more species of hosts generally belonging to the same or closely allied genera, and these parasites may be cited conveniently as polyxenotic in habit.

Among our immigrant species of Encyrtidae we know rather definitely that *Adelencyrtus odonaspidis*, *Anagyrus swezeyi*, *Aphycomorpha araucariae*, *Blepyrus mexicanus*, *Pauridia peregrina*, *Pseudococcobius terryi* and *Xanthoencyrtus fullawayi* are all monoxenotic. With the possible exception of *Pauridia peregrina* all of these species were introduced quite likely concurrently with their hosts, either at the first or subsequent arrivals of the latter in the Islands, and their establishment here was on that account more easily accomplished.

Anagyrus nigricornis, *Aphidencyrtus schizoneurae*, *Aphycus alberti*, *Comperiella bifasciata*, *Encyrtus infelix* and *barbatus*, *Helegonatopus pseudophanes*, *Microterys kotinskyi*, *Quaylea aliena*, *Saronotum americanum* and *Tanaomastix abnormis* are apparently all polyxenotic in habit. The establishment of such of these as were purposely introduced undoubtedly was aided by this habit, and this was true probably of most of the other species. Some of them presumably were brought in concurrently with the host or hosts which they now attack, but this is not necessarily true of all, and in fact can not possibly be true of some.

Peculiarities in the life-history and habits of parasites may also play a large part in aiding or hindering their introduction and establishment in a new environment. Thus *Pauridia peregrina* and *Blepyrus mexicanus* are known to deposit their eggs

[9] The only exception is *Aphycus hesperidum* which Mercet claims is an external parasite of *Chrysomphalus dictyospermi* var. *pinnulifer*, but I am strongly inclined to believe that the record is based on an error of observation.

in newly hatched larvae of their hosts, and *Blepyrus* indeed apparently never attacks the later stages although issuing from nearly full-grown hosts. It is at once obvious that Coccids in their earlier stages might more easily escape the attention of the careful plant-grower or importer and thus be allowed to become established in a new locality. If some are parasitized the establishment of both host and parsite is thus accomplished at the same time.

Parthenogenesis has also played a large part without much doubt in helping the establishment of certain of our immigrant species. As a general rule it may be stated quite confidently that all Encyrtidae, and for that matter most if not all Chalcidoidea, in so far as their habits have been investigated, are able to reproduce parthenogenetically under stress of necessity. Probably most species of Encyrtidae produce only males when the reproduction is parthenogenetic, and in case of the usual method of reproduction they produce in different species a variable proportion of both males and females. Before studying the habits of our local species I had never verified the existence of any other method of reproduction among the Encyrtidae, and was surprised to find that certain of our species are regularly thelyotokous in reproduction. In *Adelencyrtus odonaspidis*, *Blepyrus mexicanus*, *Encyrtus infelix*, *Pauridia peregina* and *Saronotum americanum* thelytoky is the regular means of reproduction and males are rarely produced, being in fact entirely unknown in case of *Adelencyrtus* and *Saronotum*. I have reared the *Pauridia* through many generations without finding any males, and have in fact seen but a single male reared by Mr. Ehrhorn several years ago. I have likewise reared *Blepyrus* through several generations and was able to find males of this species only by examining some bean vines at the Sugar Planters' Experiment Station at a time when both host and parasite were unusually abundant. Of *Encyrtus infelix* I was fortunate enough to rear a single male in a small series obtained in 1916, and this is the only male specimen that I have seen out of numerous specimens examined from various parts of the world. Miss Embleton in her work

on this species states that the males are excessively rare, only one occurring to about a thousand females. The existence of this habit of thelyotoky is obviously a great advantage to a species invading a new region, since it might become established under favorable conditions from a few females or even from a single specimen. Conversely the arrhenotokous habit of reproduction may act disadvantageously before a species is well established, since the rapid dispersal which usually takes place will tend to increase the difficulties of the sexes finding each other, and thus restrict the necessary fertilization of the females.

In conclusion we may summarize our knowledge of the local Encyrtid fauna somewhat as follows: The endemic fauna is represented by five genera with about twenty to twenty-five species. Eighteen genera of introduced Encyrtidae have been recognized already, with two or three species as yet unworked which may raise the number of genera to about twenty. The source of three species is undoubtedly North American, and the rest of the immigrant species presumably have arrived mostly from the Australian, Polynesian or Oriental regions, although we have no very definite clews to the origin of several. At least two and possibly four species having been collected years ago but not recovered since are probably extinct in the Islands. Only two species are definitely known to have been introduced intentionally, although several others may have been as the records of early introductions are fragmentary. About seven of the immigrant species are monoxenotic and eleven others are polyxenotic, the former having been introduced presumably concurrently with their hosts, the latter not necessarily so. Peculiarities in the habits and life history have had some influence on the introduction and establishment of the Hawaiian Encyrtidae, since oviposition in the earlier stages of the host, thelyotokous reproduction and the polyxenotic habits of certain species are obviously advantageous in the dispersal of the species into new regions.

Descriptions of New Genera and Species of Hawaiian Encyrtidae (Hymenoptera.)*

BY P. H. TIMBERLAKE.

The types of the following new species will be placed in the collection of the Hawaiian Entomological Society, and some of the paratypes will be retained by the writer for ultimate deposit in the U. S. National Museum.

ECTROMATINI.

Anagyrus nigricornis n. sp.

Female: Head shaped nearly as in *A. dactylopii* (Howard) or *A. pseudococci* (Girault), being moderately thin fronto-occipitally with the dorsal surface well rounded; frontovertex nearly twice as long as wide at the posterior ocelli; the ocelli arranged in an equilateral triangle or nearly so, the posterior pair nearly their own diameter from the eye-margins and about twice as far from the occipital margin; eyes rather large, broadly oval, somewhat diverging anteriorly; face and cheeks not over one-half as long as the eyes; the scrobes forming narrow sulci slightly converging above. Antennae inserted close to the clypeal margin; scape broadly expanded beneath with its lower margin nearly uniformly rounded, about one-half as wide as long; pedicel nearly equal to the first funicle joint; funicle cylindrical, increasing slightly in thickness distad with the joints becoming successively shorter, the first three times as long as wide, the sixth a little longer than wide; club oval and nearly as long as the last three funicle joints combined.

Pronotum arcuate, the posterior margin acutely emarginate medially; posterior margin of the mesoscutum sinuate on each side of the middle. Abdomen as long as the thorax, the ovipositor not protruded.

Wings broad, reaching well beyond apex of abdomen; marginal vein fully thrice as long as thick and nearly equal to the slender stigmal, the postmarginal a little longer than the stigmal; speculum broad and widely separated from the posterior margin of the wing.

Sculpture finely granular-alutaceous, finer on the mesopleura, slightly coarser on the abdomen, the venter becoming smoother at apex. Eyes with a short, thick, blackish pile; head and thorax covered with a rather thick, appressed, subsquamous pubescence of short, white hair;

*These descriptions were prepared as an appendix to the preceding paper. Records are brought up to date of publication.

the sides and venter of abdomen clothed with a moderately long, soft, whitish pubescence.

Length: 1.09 to 2.0 mm.

Head dull yellow, the cheeks brownish to blackish, the center and lower part of occiput black; thorax brownish yellow, often darker or becoming decidedly brownish on the axillae and scutellum; propodeum, metapleura and abdomen more or less dark brown or brownish black. Antennae black, the scape with an annulus at base near the radicle joint and an oblique band before the apex white. Legs paler yellowish than the body, the coxae pale brown, the upper margin of the front and hind femora and tibiae often slightly brownish, the apex of the last joint of the tarsi dark brown or blackish. Wings hyaline, the veins dark brown.

Male: Head considerably thinner than in the female; the eyes much smaller and not greatly longer than wide; frontovertex a little wider than long; the ocelli in an obtuse-angled triangle, the posterior pair fully their own diameter from the eye-margins and about one-third as much removed from the occipital margin; face and cheeks proportionately longer than in the female; the scorbes in the form of short, parallel sulci reaching to the middle of eyes. Antennae inserted much more remotely from the clypeal margin or on a level with the lower corners of the eyes; the scape much shorter and narrower, being about a third as wide as long; pedicel hardly longer than thick; flagellum cylindrical, not thickened distad; the funicle joints incised on the upper side at the articulations, the first joint about four times as long as thick, the following joints somewhat shorter; each joint with a full whorl of long hair at the base and a half whorl at apex on upper side; club solid, as long as the last two funicle joints combined, pointed at apex, with hardly verticillate hair gradually shortening towards apex, the lower margin on basal half set with a row of five short, clavate hairs.

Abdomen smaller, depressed and plane above, the venter with a median plica. Wings shorter and proportionately wider, the marginal vein much shorter or about one-half as long as the stigmal. Pubescence of face somewhat thicker, that of the frontovertex a little longer and more erect.

Length: .69 to 1.29 mm.

Head yellow, the frontovertex orange yellow with the ocellar region more or less black; face with a more or less distinct, narrow, transverse brownish band between the lower corners of the eyes; scrobes, ventral margin of the cheeks and most of the occiput black; dorsum of thorax, metapleura and abdomen brownish black, the mesonotal sutures laterally more or less yellowish; mesopleura and sternum brownish yellow, the propleura brighter yellow. Legs and wings as in female; the antennae blackish with apical half of the flagellum often yellowish brown, the basal third of the scape and lower margin at apex white, the two pale areas often connected along the lower margin on the inner side.

Described from 22 females, 19 males (type, allotype and paratypes) all except one pair taken at various localities on Oahu at all elevations (Swezey and Timberlake); one pair (paratypes) taken on Puu Kapele, Kauai (Swezey). The type and allotype were reared experimentally from *Pseudococcus lounsburyi* Brain from a female captured on Kaumuohona, Oahu (Timberlake). It has been reared experimentally also from *Pseudococcus longispinus* (Targ.) and under natural conditions from *P. montanus* Ehrhorn, *P. gallicola* Ehrhorn and *Ripersia palmarum* Ehrhorn. It has been found associated also with *Trionymus insularis* Ehrhorn on *Eragrostis variabilis*. The oldest specimen seen is a female taken in Honolulu, Mar. 10, 1910 (Swezey).

Anagyrus swezeyi n. sp.

Female: Head subhemispherical, rather thin fronto-occipitally, the curvature seen in side view nearly uniform from occipital to oral margin, the outline in frontal view nearly circular, with the eyes somewhat protuberant below; frontovertex about a fourth longer than wide; ocelli in a right-angled triangle, the posterior pair about one-half more than their own diameter from the eye-margins and about one-half as far from the occipital margin; eyes rather narrowly oval, a little wider and very slightly diverging anteriorly; face slightly inflexed and concave below the middle of the eyes, the scorbes in the form of two narrow, deep grooves converging above but not nearly meeting; cheeks short or about equal to the width of the eyes. Antennae inserted close to the clypeal margin; scape compressed and about one-third as wide as long excluding the radicle joint, its lower margin uniformly rounded; pedicel slender and as long as the first funicle joint; funicle slender, cylindrical and increasing slightly in thickness distad, the first joint about three times as long as thick, the following joints about equal and a third shorter than the first; club a little thicker than the funicle, and as long as the two preceding joints and one-half the fourth combined.

General form of body slender and somewhat elongate; pronotum arcuate; posterior margin of the mesoscutum slightly bisinuate on each side of the middle; scutellum not much longer than wide and rather acute at apex. Abdomen about a fourth longer than the head and thorax combined, very narrowly triangular as seen from above; ovipositor sheaths shortly protruded.

Wings reaching slightly beyond apex of abdomen, narrow; marginal vein about twice as long as thick and nearly as long as the stigma, the latter short and straight, with short, narrow spur at apex, the postmarginal vein very short; discal ciliation very dense, the speculum very oblique and narrow and broadly interrupted below the middle.

Head, pro- and mesonotum opaquely alutaceous; the propodeum and pleura less opaque and microscopically granular-reticulate, the abdomen somewhat more coarsely granular-reticulate, the ventrites much smoother and more or less polished especially on the last segment. Eyes with a short, thick brownish pile; head, notum, metapleura and sides of abdomen covered with a thick, appressed, short white pubescence.

Length: 1.11 to 1.57 mm. (or 1.66 with abdomen distorted).

Head yellow ocher (Ridgway), the clypeal margin, cheeks and postorbital margin paler; a small dot between eyes and base of antennae, the occiput except dorsally and centrally, and the occipital margin of cheeks black; pro- and mesonotum clove brown (Ridgway) often suffused with yellowish on the sides of the scutum and at apex of scutellum; propodeum nearly black; pleura and sternum yellow ocher, the propleura paler yellowish, the metapleura dusky; prepectal plate and tegulae mostly white; abdomen clove brown, more yellowish brown within the dorsal concavity at base, the sides sometimes suffused with yellowish above, the ventrites when exposed in distorted specimens brownish yellow. Radicle joint of antennae black; the scape white, with a very narrow annulus close to base, a broad oblique band at the middle and the extreme apex black; basal half of pedicel and first funicle joint black, rest of pedicel and next two funicle joints white, last three funicle joints blackish brown, the fourth often paler or even whitish at base; club pale yellow. Legs nearly concolorous with the mesopleura or a little paler, the last joint of the tarsi blackish. Wings hyaline, the veins brown.

Male: Head much thinner than in the female; the eyes much smaller, frontovertex nearly twice as wide as long; the ocelli in a slightly obtuse-angled triangle, the anterior ocellus close to anterior margin of the frontovertex, the posterior pair nearly twice their own diameter from the eye-margin and somewhat less than half as far from the occipital margin; cheeks and face considerably longer, the latter more deeply concave between the lower part of the eyes, the scrobes very shallow, rather indistinct and not convergent. Antennae inserted remotely from the clypeal margin on a level with the lower corners of the eyes, scape proportionately nearly as long as in female but much narrower, being nearly linear; pedicel hardly longer than thick; flagellum slender and cylindrical; first funicle joint about five times as long as thick, the following joints gradually shortening, the sixth about three times as long as thick; club nearly as long as last two funicle joints, acute at apex and solid; the whole flagellum clothed with moderately long erect hair gradually shortening towards apex, arranged somewhat indistinctly in about six whorls on the first funicle joint, in four on following two joints, in three on the

last three funicle joints, and more scattered on the club; the under side of the sixth funicle joint set with a row of about eight or nine short, erect, clavate hairs including one or two on the base of the club.

Abdomen, depressed, triangular, cordate at base and truncate at apex, the ventral plica strongly developed. Wings relatively wider than in female, the disk considerably less densely and more coarsely ciliated.

Head very finely rugosely reticulate on the face and slightly more coarsely rugulose on the frontovertex; mesopleura minutely reticulate; the first tergite of abdomen with much more evident and coarser reticulations than in the female. Head much less pubescent, the face and cheeks with only a sparse pubescence, the frontovertex nearly bare; the abdomen entirely free from the white, appressed pubscence of female, and with only a few scattered, soft hairs on the dorsum.

Length: .58 to 1.05 mm.

Head brownish black, slightly shiny, the facial ridge more brownish, face and clypeal margin below the antennae and most of the cheeks strontian yellow (Ridgway); thorax and abdomen black, the notum slightly shiny, the dorsum of abdomen with an iridescent luster. Antennae brownish black, the flagellum more brownish, the base of scape yellow. Legs pale yellow; the coxae fuscous except at apex; the front and hind tarsi somewhat brownish on the upper side, becoming darker at apex; the last two joints of the middle tarsi rather dark brown. Wings as in the female.

Described from 31 females, 38 males (type, allotype, and paratypes) from various parts of Honolulu, Oahu, either reared from *Trionymus insularis* Ehrhorn or swept from Bermuda grass on which the mealybug is commonly found (Swezey and Timberlake); 9 females, 11 males (paratypes) reared from the same host on *Sporobolus*, Oahu Plantation, Oahu; one pair (paratypes) swept from Bermuda grass at Lihue, Kauai (Timberlake); and one female (paratype) from Lupe Ditch, 1200 feet, Maui (Giffard and Fullaway). The oldest specimen seen is a male (paratype) collected at Waialua, Oahu, Aug. 24, 1910 (Swezey).

Xanthoencyrtus apterus n. sp.

Female: Head somewhat wider than thorax, very thin fronto-occipitally, the face and frontovertex lying in one plane, as seen from in front nearly circular; occiput concave above, with the neck inserted considerably above the center; space between the eyes from the antennal sockets to the occipital margin a little longer than wide, rather deeply concave with a triangular, raised area on the dorsal half, the vertex but little

narrower than the pronotum; ocelli very small, probably not functionable, arranged in a small, obtuse-angled triangle, the posterior pair close to the occipital margin and their distance apart equalling the distance to the eye-margins; the latter acute; eyes elonagte oval, lying parallel with the longer axis of head; cheeks about as long as wide, and as wide as the eyes. Antennae inserted slightly above the clypeal margin; the scape flattened but hardly expanded below, including the radicle joint about four times as long as wide; pedicel somewhat shorter than the first two funicle joints combined; and wider at apex than the following joint; flagellum cylindrical, increasing distinctly but not greatly in thickness distad; funicle joints all nearly equal in length, the first and sixth slightly longer, the first somewhat longer than wide, the last nearly as wide as long; club nearly as long as the three preceding joints combined, a little wider and rounded at apex, distinctly three-jointed, the first and third joints slightly longer than the second.

Thorax short and much depressed; pronotum but slightly declivous although prolonged and constricted towards the apex, the posterior portion transverse, and about two-thirds as long as the mesoscutum, its posterior margin but slightly arcuate; the mesoscutum twice as wide as its median length, its posterior margin perfectly truncate; axillae wider than long, acutely meeting medially; scutellum small, shorter than the mesoscutum, a little wider than long and broadly rounded at apex; propodeum very short in the middle and longer at the sides, the metapleura very small and obliquely transverse. Abdomen nearly twice as long as the head and thorax combined, acute at apex and somewhat wider at base than the thorax; the vibrissal plates situated half way or a little more from the middle towards the base and often concealed beneath the first tergite; ovipositor not protruded. Wings rudimentary, the front pair not reaching beyond the apex of the scutellum.

Surface of head, thorax and abdomen smooth and shining with a fine reticulation on the mesoscutum barely perceptible. Eyes with a short, sparse pile; head and thorax with a short dark-colored, inconspicuous pubescence that is nowhere abundant.

Length: .94 to 1.36 mm.

Head and thorax about yellow ocher (Ridgway) varying to tawny especially on the head; the underparts of the thorax and legs a little paler yellow; abdomen black or piceous, becoming brownish at the base of the first tergite; scape and pedicel concolorous with the face, the flagellum black, more dilutely at base, the first funicle joint appearing somewhat yellowish in balsam mounts.

Male: Head wider and shorter than in the female, being wider than long; space between eyes from the antennal sockets to the occipital margin about as wide as long, the face and frons concave as in the female but without the triangular elevation on the upper part; scape and pedicel very nearly the same, the flagellum much longer, cylindrical and not thickened distad; first funicle joint nearly four times as long as thick, the following joints gradually shortening, the sixth about twice

as long as thick; the club somewhat longer than the last two funicle joints combined, solid, and acute at apex; funicle with moderately long, verticillate hair, the first joint with four whorls, the following joints with three, the club with similar less distinctly verticillate hair gradually shortening towards apex; the last funicle joint set with a row of four short, clavate scale-like hairs on the under side, the base of the club with two more. Thorax and wings as in the female, except that the scutellum is slightly longer and a little acute at apex. Abdomen a little longer than the thorax, very broadly ovate or nearly circular in outline as seen from above, and very strongly depressed. Face very finely reticulate, mesoscutum more distinctly reticulate than in female, and the basal tergite of abdomen with a comparatively coarser reticulation.

Length: .69 to .88 mm.

Coloration distinctly more reddish, especially on the abdomen, which is not black as in the female; antennae and legs as in the female.

Described from 6 females, 3 males (type, allotype and paratypes) collected on *Eragrostis variabilis* at Nuuanu Pali, Oahu, Oct. 8, 1916 (Swezey and Timberlake) and 2 females, 2 males (paratypes) from the same locality, Nov. 12 and 19, 1916 (Giffard and Fullaway). The species is probably parasitic on *Trionymus insularis* Ehrhorn, as the grass on which the parasite was found is commonly infested with this Coccid.

Xanthoencyrtus laysanensis n. sp.

Female: Differing from *X. apterus* as follows: Head perfectly circular as seen from in front; the space between the eyes from the antennal sockets to the occipital margin as wide as long, the depression with a rather narrow median ridge on the upper part instead of a triangular raised area; the ocelli absent. Antennal scape somewhat expanded beneath and over a third as wide as long excluding the radicle; pedicel no wider at apex than the following joint; flagellum distinctly stouter and increasing but very slightly in thickness distad, the relative proportions of the funicle joints remaining about the same; club not distinctly wider than the funicle, its middle joint the shortest. Posterior margin of the pronotum somewhat more arcuate, making the mesoscutum slightly longer medially. No reticulations on the mesoscutum apparent under highest magnification of the Zeiss binocular.

Length: .90 to 1.35 mm.

Coloration the same as in *apterus*, the flagellum rather deeper black and not at all paler at the base of the funicle, the basal tergite of the abdomen somewhat more yellowish at base.

Male: Similar to the male of *apterus* with the scape a little wider, and the abdomen no longer than the thorax and much less circular.

Head and mesoscutum smooth and not reticulate, the basal tergite distinctly reticulate.

Length: .71 to .86 mm.

Coloration as in the female, not reddish as in *apterus*, the abdomen black.

Described from 3 females, 3 males (type, allotype and paratypes) collected on Laysan Island, December, 1912 (Fullaway).

Xanthoencyrtus semiflavus n. sp.

Female: Similar to *X. apterus* and differing as follows: Head a little wider, being considerably wider than the thorax and in frontal view distinctly wider than long; the space between the eyes from the antennal sockets to the occipital margin a little wider than long, with a transversely oval depression on the lower part somewhat above the antennae, the vertex fully as wide as the pronotum; ocelli rather more minute, the posterior pair distinctly more remote from the eye-margins than their distance apart. Antennae more nearly as in *laysanensis* in thickness or width; the scape considerably wider than in *apterus;* the pedicel not so distinctly wider at apex than the following joint; the flagellum stouter but increasing in thickness distad in about the same proportion, the first funicle joint relatively longer, the apical funicle joint slightly wider, the last two being as wide as long; the club as in *apterus* Thorax and abdomen about as in *apterus*, the scutellum rather more acute at apex, the ovipositor slightly protruded. Sculpture smooth, with no reticulations apparent on the mesoscutum.

Length: 1.38 mm.

Coloration similar to *apterus* except that the abdomen is not yellowish at base although somewhat brownish, the funicle yellow instead of black, with the last joint somewhat dusky and the club black, the tarsi yellowish white and distinctly paler than the rest of the legs.

Male: Unknown.

Described from 1 female (type) collected on the southern slopes of Diamond Head, Oahu, in the spring of 1917 (Fullaway).

Xanthoencyrtus fullawayi n. sp.

Female: Head very thin fronto-occipitally, seen from in front nearly circular, the entire anterior or dorsal aspect lying in one plane; the occiput strongly concave above with the neck inserted far above the center; space between the eyes from the antennal sockets to the occipital margin about a fifth longer than wide, and very slightly convex from

side to side; ocelli well developed, arranged in a very obtuse-angled triangle, the anterior ocellus somewhat closer to the occipital margin than to either of the posterior ocelli, the latter almost touching the occipital margin and about equidistant from the anterior ocellus and the eye-margins, being remote from the latter; occipital margin acute; eyes subovate, somewhat elongate, being broadest anteriorly; cheeks strongly narrowed towards the mouth, as long as wide at base, which equals the width of the eyes. Antennae inserted slightly above the clypeal margin and a little farther apart than in *apterus;* the scape not flattened but moderately thickened, being thickest a little beyond the middle, the under side somewhat furrowed towards the apex; pedicel slightly longer than the first two funicle joints combined; flagellum cylindrical and slightly clavate; first funicle joint distinctly longer than thick, the following increasing gradually in size, all somewhat transverse and shorter than the first joint; club as long as the last five funicle joints combined, a little wider than the sixth, somewhat acute at apex, and distinctly two-jointed, the first joint about one-half as long as the second.

Thorax very strongly depressed and longer than in *apterus;* pronotum long at the sides but not prolonged anteriorly into a neck, its posterior margin with a very deep angular emargination at the middle; mesoscutum as wide as its median length, the portion lying behind a line drawn between the posterior corners of the pronotum transverse and as narrow as the same area in *apterus*, its posterior margin perfectly truncate; axillae strongly narrowed and meeting within, prolonged and narrowed on the sides posteriorly, their scutellar margin somewhat arcuate; scutellum large, as wide as long, posteriorly triangular with the apex rounded; propodeum very short at the middle and much longer at the sides; the metapleura subtriangular and moderate in size. Abdomen a little wider than the thorax and nearly a third longer again, widest at the middle, strongly narrowed posteriorly with the apex rounded; the vibrissal plates located at or considerably before the middle, with the vibrissae not conspicuous; ovipositor not protruded.

Wings fully developed, rather narrow and reaching beyond the apex of the abdomen; the disk uniformly ciliated to the base, the speculum rather wide, reaching from the base of the stigmal vein very obliquely towards the posterior margin, connected there with a submarginal basal hairless streak, and indistinctly divided just below its middle; marginal cilia short; the nervures reaching nearly to the middle of the wing, the marginal vein thick, a little longer than wide, the postmarginal almost absent, the stigmal a little longer than the marginal, constricted at base and enlarged somewhat triangularly at apex. Legs showing no marked peculiarities, the tibiae and tarsi slender and cylindrical, the middle tibial spur no longer than the first tarsal joint.

Head and thorax smooth and somewhat shining, the face and frons finely and somewhat sparsely punctate, the mesoscutum with similar slightly closer punctures, the pronotum duller, with punctures not so distinct, scutellum smoother with the punctures fainter and sparser;

tergites of abdomen with a very fine, delicate reticulated surface sculpture.

Eyes with a short, rather sparse pile; the pubescence on head and thorax short, yellowish, rather sparse and not conspicuous.

Length: 1.07 to 1.23 mm.

Coloration of body uniformly yellow, nearly ochraceous orange (Ridgway), the underparts of thorax and the legs paler yellow, the apex of the last joint of the tarsi blackish; antennal scape and pedicel fuscous, becoming testaceous at apex of the latter, flagellum darker or inclining to blackish; wings hyaline with the veins fuscous.

Described from a female (type) reared Sept. 2, 1916, from *Pseudococcus saccharifolii* (Green) from Pahala, Hawaii (Swezey), and another (paratype) found in a vial with a specimen of *Pseudococcobius terryi* (Fullaway) without data. This specimen may be the type of Fullaway's description of the supposed male of *terryi*.

Pauridia n. g.

Female: Head in frontal view nearly circular in outline, in side view subtriangular, with occipital side much the longest, the dorsal side the shortest and rounded; the facial and occipital sides forming an acute angle at the mouth; head in other words strongly convex dorsally with the face abruptly reflexed; frontovertex about a half longer again than wide; ocelli in an obtuse-angled triangle, the posterior pair close to the eye-margins; eyes moderate in size, about a fourth longer than wide, and widest anteriorly, their long axis oblique to the plane of the frontovertex; occiput very slightly convex with the neck inserted near the center; face and cheeks long, the latter as long as the dorsal orbits of eyes; the face deeply hollowed out above to form the scrobes which nearly meet in an acute angle just below the facial angulation and separated below by a low, triangular prominence between the antennae. The latter inserted moderately far apart close to the clypeal margin; scape cylindrical and just reaching to the frons; pedicel twice as long as thick or nearly as long as the first four funicle joints combined; flagellum moderately clavate, and finely pubescent; first four funicle joints very small, short and transverse, and also much narrower than the apex of pedicel, the fifth a little larger and somewhat transverse, the sixth considerably longer and subquadrate; club large, oval, acute at apex, wider than funicle and as long as the five preceding joints combined, its three joints about equally long. Mandibles thick at base, rather short, narrow at apex with two short, equal, not very acute teeth. Maxillary palpi short, two-jointed, the basal joint no longer than thick, the apical nearly twice as long.

Thorax moderately convex, the scutum, axillae and scutellum in one

plane; pronotum arcuate; the scutum about a third wider than long; the axillae nearly meeting medially; the scutellum triangular, with apex slightly rounded, but slightly elevated and convex, its sides abruptly declivous; propodeum short or transversely linear. Abdomen as long as the thorax, triangular in dorsal view, acute at apex, with the dorsum deeply concave, and the sides strongly compressed; ovipositor issuing from apex, the sheaths not visible, the fifth ventrite reaching to apex; the vibrissal plates situated at the basal fifth.

Wings not long and rather wide; the marginal cilia short, the discal ciliation uniform and moderately thick; speculum much narrowed above and meeting the stigmal vein; submarginal vein much thickened just before its apex and very slender before the thickening; marginal vein a trifle longer than thick, the stigmal somewhat more than twice as long as the marginal and moderately enlarged at apex, the postmarginal tapering and nearly as long as the marginal. Hind wings narrow, with the costal cell absent.

Legs slender, of moderate length, showing no particular peculiarities, the middle tibiae longer than their femora, very slender at base and moderately thickened at apex, the spur slender and almost as long as the first joint of the tarsi; hind tibiae thicker than the middle pair, tapering towards the base, the apical spur short and slender.

Sculpture opaque and alutaceous on the frontovertex with very fine scattered punctures; very finely reticulate on the mesonotum, mesopleura and abdomen with microscopic setiferous punctures on the former. Pubescence fine and inconspicuous throughout.

Male: Very similar to the female differing chiefly in the antennae and abdomen. The former slightly longer and much less clavate; the pedicel but slightly longer than thick and a little shorter than the first two funicle joints combined; flagellum but slightly increasing in thickness towards apex with a very fine, minute pubescence as in the female; first four funicle joints as wide as the pedicel, as long as wide and equal to each other throughout; the next two joints increasing distinctly in size but remaining very nearly quadrate; club solid, ovate, acute at apex, but slightly wider than the funicle and a little longer than the two preceding joints combined. Abdomen very small, not over one-half as long as the thorax, much depressed and sub-triangular with the base and sides equal, the basal corners and apex bluntly rounded.

Genotype: *Pauridia peregrina* n. sp.

This genus is considerably like *Blepyrus* Howard (which is not a Mirine but an Ectromatine genus) in general form and appearance although quite distinct in the structure of the head, antennae and venation. In Ashmead's tables it runs to *Anagyrus* Howard which, however, it does not closely resemble.

In Girault's tables it runs to *Coccidoxenus* Crawford and *Fulgoridicida* Perkins, with neither of which is it closely allied, both of these genera falling more naturally in the Mirini.

Pauridia peregrina n. sp.

Female: Fifth funicle joint varying to hardly larger if any at all than the preceding joints although typically distinctly larger. Eyes with a fine, short, moderately thick pile; the frontovertex with a few longer scattered hairs, the mesonotum with more numerous similar hairs, the vestiture not conspicuous being dark-colored and nowhere abundant.

Length: .56 to .89 mm.

Black throughout, somewhat shining except on head, but hardly metallic; legs concolorous, all the tarsi except at apex, the trochanters, knee articulations, and apex of the middle tibiae yellow, the middle tarsi and tibial spur paler yellow; antennae dull black; wings hyaline, the veins fuscous.

Male: The only male seen is mounted on a slide and seems to be identical with the female throughout in coloration and structure except as brought out in the generic description.

Length: .79 mm.

Described from 74 females (type and paratypes) all reared from *Pseudococcus krauhniae* (Kuwana) or associated with this mealybug, Honolulu, Oahu (Timberlake); 1 female (paratype), Waiamao Valley (part of Palolo), Oahu, Apr. 9, 1916 (Timberlake); 1 male, 4 females (allotype and paratypes) reared from mealybugs on pigeon peas, Honolulu, June 20, 1911 (Ehrhorn); 3 females (paratypes) reared from mealybug on *Cassia fistula*, Honolulu, Dec. 4, 1913 (Ehrhorn); and 1 female, Olowalu, Maui, May 15, 1918 (Giffard and Fullaway). Also from the following foreign material: 5 females (paratypes) reared from mealybug, Amoy, China (C. P. Clausen), California State Insectary No. 3306; 1 female (paratype), Fiji, 1905 or 1906 (F. Muir); and 7 females (paratypes) reared from mealybug, Alhambra, California, Nov. 1, 1918 (H. S. Smith), California State Insectary No. 3451.

This species is common in Honolulu, and in the several thousand specimens that I have reared no males have been detected.

Encyrtus barbatus n. sp.

Very closely allied to *bicolor* (Howard) and similar structurally except as follows: Face in the female distinctly transversely lineolate, the beard on the cheeks considerably longer and more conspicuous, the bristles on the sides of the abdomen and towards the apex somewhat longer and more prominent.

Female: Head shaped as in *bicolor* (Howard), *infelix* (Embleton) and allied species; the transverse carina separating the frons and face extending outward to the lower corners of the eyes, the middle portion of the median indentation of this carina curved slightly downward towards the mouth; the longitudinal carina on the cheeks and postorbital region, very distinct and extending considerably in front of the eyes; carina connecting the posterior ocelli straight or slightly arcuate; antennae, thorax, wings, legs and abdomen as in allied species.

Frontovertex finely, transversely lineolate with distinct, scattered and remote punctures; face more coarsely, transversely rugoso-lineolate and more or less reticulate on the median part, but becoming smoothish above within the indentation of the transverse carina; thorax finely granular alutaceous, with the propodeum smooth and polished except at the sides; the pro- and metapleura and abdomen delicately reticulate; the mesopleura microscopically reticulate or appearing smooth and polished under moderate magnification.

Frontovertex with a fine whitish scattered pubescence arising from the punctures, the face with a similar pubescence; cheeks with a beard of long, black, bristle-like hair, apex of clypeus and base of mandibles with somewhat shorter black hairs, posterior margin of the pronotum, and the mesoscutum rather densely covered with recumbent black hair changing to white on the posterior half of the scutum; axillae and tegulae with moderately long, black, bristle-like hair; base of the scutellum with a fine, soft, whitish pubescence with a few much longer pale-colored hairs in front of the apical black fascicle; sides of the abdomen with several very long black hairs besides the vibrissae, the apex with shorter whitish hair.

Length: 1.67 to 2.13 mm.

Head nearly raw sienna (Ridgway) but more or less infuscated especially on the frontovertex which becomes brownish to quite fuscous, the cheeks on and just below the carina black; pleura of thorax nearly pure raw sienna, always clearer yellowish than the head; notum of thorax about ochraceous orange (Ridgway) with the posterior margin of the pronotum, usually the anterior margin of the scutum, posterior half or more of the scutum and declivous portion of the axillae black, the basal margin of the scutellum often blackish; rest of the scutum more reddish

or about xanthine or Mars orange (Ridgway), forming a narrow, more or less arcuate transverse band on the anterior part; in paler specimens the band is wider or reaching practically to the anterior margin of the scutum, and the axillae and scutellum are entirely orange yellow; propodeum concolorous, somewhat dusky with a bright luster; abdomen shining blue black above with a strong luster, and with a greenish luster beneath. Antennae dark brown to black, the scape pale yellowish or whitish with its dorsal margin and the lower margin of the radicle joint black. Front and hind coxae, most of the front and middle femora and of the hind tarsi white or yelowish white; dorsal and ventral margins of the front femora, their tibiae and tarsi fuscous; middle coxae, upper side of middle femora and base of their tibiae blackish, the tibiae changing to brownish yellow at apex with the spur and tarsi concolorous; hind femora brownish yellow becoming blackish on the dorsal margin or almost entirely blackish, the hind tibiae and basal half or sometimes only the basal fourth or fifth of the first joint of their tarsi black; apex of the middle and hind tarsi blackish. Wings deeply infuscated with the usual hyaline area beyond the transverse fascicle of hair, the hind wings entirely hyaline; the veins fuscous, but the apical part of the submarginal vein hyaline, coterminous with the hyaline area of the disk.

Male: Quite dissimilar from the female in many respects. The head much thinner fronto-occipitally, with the eyes much smaller; carinae of the face, cheeks, and vertex entirely absent; frontovertex about twice as wide as long with the ocelli arranged in an extremely obtuse triangle, the median ocellus being hardly more than twice as far from the occipital margin as the posterior pair which are rather remote from the eyes. Antennae inserted higher up on the face; the scape short, flattened and widened towards apex; pedicel short or no longer than thick; flagellum cylindrical and slightly thicker than the pedicel; funicle joints nearly equal in length, about twice as long as thick, incised at the articulations and each with two whorls of long hair; club solid, nearly as long as the two preceding joints combined, tapering towards the acute apex, and clothed with long hair which gradually shortens towards the apex.

Thorax nearly as in the female, but the axillae much less elevated and not so strongly or abruptly declivous posteriorly; abdomen a little shorter than the thorax, strongly depressed, subtriangular with the sides equal and the basal corners and apex rounded. Wings without the transverse band of hairs on the basal half, the disk uniformly ciliated; the speculum widening towards the posterior margin and interrupted below the middle; marginal vein slightly longer than in the female, the postmarginal proportionately much longer, the stigmal, although by no means short, is relatively somewhat shorter than in the female, and hardly longer than half the postmarginal.

Sculpture as in the female, except that the head is granular alutaceous and opaque like the thorax. Pubescence on the face and frontovertex similar, but the black beard on the cheeks, clypeus and mandibles entirely absent; mesoscutum and axillae with short, recumbent black hair, the

posterior margin of the pronotum with similar whitish hair; scutellum with scattered black hair and a fine, silky, pale pubescence on the basal margin, the apical fascicle of hair very much shorter and sparser than in the female; abdomen provided with a fine, soft, sparse pubescence above, and with three long, bristle-like, blackish hairs on each side behind the middle, which shorten toward the apex; the vibrissae subbasal and very long.

Length: .91 to 1.45 mm.

Frontovertex deep chrome (Ridgway), face and cheeks creamy white; center of occiput and postorbital region connecting with a spot on cheeks next to the eyes black; notum of thorax ochraceous orange (Ridgway) with the pronotum except laterally, an oval to subtriangular mark on the anterior part of the scutum usually reaching about to the middle, more rarely to the base, sometimes the axillae medially and scutellum on basal margin, a spot on apex of scutellum sometimes connecting with the basal spot, the metanotum and the middle part of the propodeum black; abdomen black, with the lateral margins from the vibrissal plates to apex yellow. Antennae dusky yellowish, the scape pale yellowish with the lower margin at base including the whole radicle joint and the dorsal margin on apical half black, the base of pedicel blackish. Front legs, the middle legs except coxae, and the hind coxae and femora yellowish white; upper margin of the front femora dusky, their tibiae and tarsi slightly more brownish; the middle tibiae on basal half except at the extreme base somewhat fuscous; the middle coxae, apex of the last joint of the front and middle tarsi, dorsal margin of the hind femora except at base, and the hind tibiae and tarsi black. Front and hind wings entirely hyaline, the veins very pale or dilutely fuscous.

Described from 1 female, 4 males (type, allotype and paratypes) reared from *Saissetia hemisphaerica* (Targ.), on ferns, Honolulu, Oahu, March, 1905 (Alexander Craw); 7 females, 6 males (paratypes) reared from *Saissetia nigra* (Nietner) on ferns, Honolulu, Nov., 1917, to Feb., 1918 (Fullaway); 1 pair (paratypes), Palolo Valley, Oahu, Dec. 26, 1914 (Swezey); 2 females (paratypes), Honolulu, Oct. 10, 1915, and Dec. 10 1917 (Swezey, Timberlake); 7 females (paratypes) from *Saissetia hemisphaerica* on coleus, and 3 females, 5 males (paratypes) from *Saissetia nigra* on ferns, Honolulu, May 6-18, 1919 (Timberlake).

Also from the following foreign material: 1 female, 1 male (paratypes), Manila, Philippine Islands (G. Compere); 4 females (paratypes), Larat, Dec., 1907 (F. Muir) and 1

female (paratype), Pekalongan, Java (F. Muir). The specimens from Java and Larat have the first joint of the hind tarsi black only at the base, and the hind femora are variable in the extent of infuscation as in the local specimens.

MIRINI.

Bothriencyrtus n. g.

Female: Head moderately thin fronto-occipitally, subhemispherical, the curvature as seen in side view nearly uniform from oral to occipital margin with the eyes anteriorly somewhat protuberant, and facial outline sinuate; in frontal view appearing considerably wider than long, the frons and each eye about equally wide, the occipital margin transverse, the cheeks rounded and convergent towards the broad and truncate oral margin; occiput rather deeply concave, its dorsal margin sharply angled with the vertex; frontovertex flattened, a little longer than wide, the ocelli in an obtuse-angled triangle, the anterior one considerably behind the center, the posterior pair almost touching the occipital margin and a little more than their own diameter from the eye-margins; eyes very broadly oval, broadly rounded at each end, their long axis parallel with the plane of the frontovertex; cheeks not short, and as seen in side view of head wide; face as broad as long, slightly hollowed out, with the upper limit of the concavity gradually passing into the contour of the frontovertex between the anterior corners of the eyes, just below with a shallow but distinct transverse groove connecting the extreme anterior inner corners of the eyes, on each side a rather sharp carina descending towards the mouth from the eyes, the antennal scrobes forming rather deep grooves, hardly convergent, passing into the transverse groove above, and separated throughout by a broad, rounded, and but slightly elevated prominence. Antennae inserted far apart rather close to the clypeal margin, and moderately long, somewhat clavate: scape reaching about to the middle of the eyes, slender, flattened and a little widened towards apex; pedicel nearly equal to the first two funicle joints combined; first funicle joint slender and about a half longer than thick, the following joints about equal and a little shorter than the first, gradually widening distad, the second slightly longer than thick, the last two slightly wider than long; club wider than the funicle and obliquely truncate as in *Bothriothorax*. Mandibles broad at apex, with three strong acute teeth, the middle one somewhat the longest with other two somewhat diverging from it.

Thorax but slightly convex above, the scutum, axillae and scutellum lying in one plane; axillae transverse, acute within and moderately widely separated; scutellum rather wide and large, a little longer than wide, and rounded at apex, the sides gradually sloping, but becoming abruptly declivous towards apex which is strongly elevated above the

metanotum; propodeum very short and declivous at the middle, also declivous and moderately long at the sides, the metapleura rather large and forming an acute angle with the dorsal surface of the propodeum. Abdomen depressed, broadly ovate, slightly longer than wide and somewhat shorter than the thorax, the apex acute; vibrissal plates situated a little before the middle; ovipositor protruded about one-fourth the length of the abdomen, the sheaths slender and cylindrical; the fifth ventrite reaching to the apex and enclosing the base of the ovipositor.

Legs about normal in length and structure; middle tibiae considerably thickened at apex, the spur short and stout or hardly more than one-half as long as the first tarsal joint, which is a little thickened; the hind tibiae with a small but distinct spur. Wings broad; the marginal vein punctiform and emitting the stigmal before quite reaching the margin, postmarginal vein very short, the stigmal moderately long, not enlarged at apex but with a small spur.

Frontovertex and mesoscutum with shallow, thimble-like punctures as in *Bothriothorax* over a reticulate, shining surface; face delicately shagreened and lineolate, transversely between the eyes, longitudinally on the prominence between the antennae and obliquely laterad of the antennal sockets, the scrobes and transverse groove smooth or nearly smooth; cheeks and postorbital region more coarsely longitudinally lineolate, enclosing a smooth area at the anterior orbits of the eyes; notum of thorax and the mesopleura finely, regularly reticulate, the axillae showing a slight trace of the thimble-punctures, the scutellum none; prepectal plates and tegulae more coarsely reticulate, the latter also more irregularly; the metapleura more finely reticulate than the mesopleura; abdomen above about as coarsely reticulate as the prepectal plates. Coloration metallic, the head in large part strongly refulgent, the thorax much less shining, the abdomen but little more than the thorax; wings hyaline.

Genotype: *Bothriothorax planifrons* Howard.

This genus without question is closely allied to *Bothriothorax*, but may be recognized by the peculiarities in the shape and structure of the head.

Bothriencyrtus insularis (Cameron).

Encyrtus insularis Cameron, Mem. Manchester Lit. & Phil. Soc., Vol. 10 (3rd Ser.), 1886, p. 243.

Bothriothorax insularis Ashmead, Fauna Hawaiiensis, Vol. 1, Pt. 4, 1901, p. 321.

Blepyrus insularis Perkins, Fauna Hawaiiensis, Vol. 1, Pt. 6, 1913, p. cvi.

Insularis is placed in *Bothriencyrtus* somewhat doubtfully as it is known only by description. If Cameron was right in

asserting that his specimen was a male and resembled *Bothriothorax* in some respects it may rightfully belong here, although the venation apparently is quite different, but perhaps not more so that sometimes occurs in opposite sexes within certain genera.[1] Cameron states that this species was found by Blackburn on several Islands, and if still present in the Islands and in our collections it can hardly be anything but *Blepyrus*, although I am quite unable to reconcile *Blepyrus* with Cameron's description.

Quaylea n. g.

Female: Head moderately thick, with the dorsal surface strongly convex, the face reflexed but the frons not prominent; in side view appearing triangular except that the dorsal side is rounded, the facial and dorsal sides subequal and considerably shorter than the occipital side; in frontal view appearing fully rounded above but becoming somewhat narrowed towards the mouth below the eyes; occiput slightly concave, with the neck inserted at the center; eyes medium-sized, touching the occipital margin posteriorly, and descending half way to the oral margin as seen in frontal view of head, in shape subtriangular with bulging sides and wider anteriorly, the inferio-posterior margin longest, the other two sides subequal; frontovertex moderately narrow, about two and a half times as long as wide and a little narrowed at the anterior ocellus; ocelli rather large, in an actue-angled triangle, the posterior pair touching the eye-margins and about their own diameter from the occipital margin, the anterior ocellus at the center of the frontovertex; cheeks about as long as the width of the eyes, with a short, delicate genal suture descending from the eyes; face about as wide as long, and as long as one-half of the head, the oral margin moderately wide and arched from side to side, the antennae separated by a low, rounded longitudinal ridge, the scrobes in the form of short, rather broad and deep impressions converging above and meeting acutely between the anterior corners of the eyes. Antennae inserted rather far apart and near the clypeal margin, rather short and slightly clavate; scape short or hardly reaching beyond the facial inflexion, compressed but not expanded beneath, the radicle joint about a third as long as the scape proper; pedicel of usual shape and a little less than twice as long as the first funicle joint, funicle joints except the last somewhat longer than wide and increasing slightly in thickness distad, the first joint shortest, the sixth about as wide as long; club oval, three-jointed, a little wider than the funicle and as long as the last three funicle joints com-

[1]For an example of this divergence in venation in the sexes consult the description of the male of *Encyrtus barbatus* above.

bined. Mandibles rather small, short and thick, tridentate at apex, with the lower tooth acute and rather long, the other two less acute and separated by a shallow emargination. Maxillary palpi four-jointed, the first three joints subequal, the first very slender at base, the fourth about twice as long as the third and triangular; labial palpi with three short joints, the first longest, the second shortest.

Thorax rather robust, convex above; pronotum and mesoscutum of usual shape; axillae short, transverse and acutely meeting or nearly so; scutellum rather large and acutely rounded at apex, strongly elevated and depressed on the disk, the sides abruptly declivous towards the base and more convex towards the apex; propodeum short at the middle, but lengthening towards the sides; metapleura not very large but reaching to the hind coxae, the metepimeron visible as a narrow sclerite between the meso- and metapleura; prepectal plates strongly chitinized and separated below from the mesopleura by a narrow sclerite which is probably a part of the mesosternum.

Abdomen triangular, strongly depressed, hardly more than half as long as the thorax; the vibrissal plates located about one-half way between the base and middle; the fifth ventrite not compressed but produced after death beyond the apex of the dorsum and enclosing the base of the ovipositor; protruded portion of the latter nearly as long as the abdomen, the sheaths slender and terete.

Wings with uniform discal ciliation, the marginal fringe short, the speculum distinct and wider below; costal cell rather wide; marginal vein about twice as long as thick, the stigmal about a third longer, the postmarginal a little longer than the stigmal; hind wings with the costal cell narrow throughout but reaching to the hooklets. Legs moderately long and slender; the middle tarsi with well developed spines on the plantar surface, the tibial spur as long as the first tarsal joint; hind tibiae with two apical spurs of which the inner is much the longer.

Sculpture very finely reticulate; the frontovertex with four rows of small punctures, the mesonotum including scutellum with numerous, minute setigerous punctures; scutellum more coarsely reticulate but becoming smoother and somewhat polished on the sides and apex; basal tergite of abdomen about as coarsely reticulate as the scutellum.

Eyes with a very fine, short pubescence; mesonotal pubescence rather long and bristle-like but not conspicuous; propodeum and metapleura bare except for a few whitish, fine hairs just behind and laterad of the spiracles; abdomen rather coarsely pubescent, the apex of the last tergite with a double row of moderately long bristle-like hairs; the ovipositor sheaths finely pubescent.

Coloration metallic black.

Male: Similar to the female with the head thinner and wider, the eyes smaller and more oval; the frontovertex much wider or as wide as long; the ocelli considerably larger, arranged in an equilateral triangle, the posterior pair touching the eye-margins and less than half their diameter from the occipital margin; scrobes converging, nearly meeting,

and then running parallel to each other for a short distance. Antennae inserted slightly higher up on the face yet still considerably below the level of the eyes; scape shorter and not quite so wide; pedicel no longer than thick and about one-half as long as the first funicle joint; funicle slender, the joints decreasing slightly in length distad, the basal joints twice as long as thick; club solid, slender, as long as the last two joints of funicle combined; the funicle and club to a less extent clothed with long, erect and numerous hairs above, and with considerably shorter, nearly decumbent hairs beneath. Sculpture about the same, except that the frontovertex is more coarsely or rugosely reticulate with scattered pin-punctures. Coloration the same with the metallic luster weaker.

Genotype: *Cerchysius whittieri* Girault, which without doubt is Ashmead's manuscript species, *Hemencyrtus crawii*.

This genus, which is dedicated to Prof. H. J. Quayle, who first made known the life-history of the type species, is most closely related to the *Hemencyrtus* Ashmead and much less closely I believe to *Cerchysius* Westwood.

The species belonging here are secondary parasites of Coccidae and parasitize the larvae of various other chalcid-flies such as *Scutellista*, *Tomocera* and *Microterys*. They pupate within the larval skin of their host which they transform into a brown puparium-like shell.

Quaylea aliena n. sp.

Female: Very closely structurally to *Q. whittieri* (Girault), on which the generic description is solely based, and differs only as follows: the frontovertex a trifle wider with the orbital row of pin-punctures less distinct; the pedicel twice as long as the first funicle joint, which is not over one-half as long as the second and about as long as wide, the following four funicle joints subequal in length and increasing slightly in width distad, each a trifle longer than wide, the sixth as wide as long and a trifle shorter than the preceding joint; the double, marginal fringe of hairs on the last tergite very much shorter and inconspicuous.

Length excluding ovipositor: .91 to 1.96 mm.

Coloration as in *whittieri* except that the mesonotum has a bluish and purplish luster instead of greenish; the frontovertex slightly more bluish, and the luster throughout more brilliant. Head deep blue-black, the frontovertex with a blue-green luster; notum of thorax bluish black, the scutellum and metapleura aeneous black with a strong green or bronzy green luster, the smooth sides and apex of scutellum and the metapleura refulgent, the underparts of thorax otherwise shining black; abdomen black, the dorsum and especially the basal tergite with a strong blue and

greenish luster; the ovipositor black. Antennae black, the flagellum appearing somewhat duller on acount of the grey pubescence. Legs black with the front knees very narrowly, apex of front tibiae, middle trochanters, a narrow annulus near base and apex of middle femora and apical fourth of the middle tibiae wtih spur and tarsi yellowish, the fringe of spines at apex of the middle tibiae and the plantar surface of the middle tarsi more reddish brown; front tarsi yellowish brown, the hind tarsi dark brown. Wings hyaline, the veins fuscous with the submarginal more yellowish.

Male: Differs structurally from the male of *schittieri* as follows: Frontovertex a little wider, and the pin-punctures less distinct; antennae considerably shorter, the scape and pedicel about the same, but the first funicle joint hardly longer than the pedicel, no longer and a little narrower than the sixth joint, the second to fourth joints nearly twice as long as wide the fifth a trifle shorter than the sixth, the latter about a half longer again than thick, the club equal to the last two funicle joints combined.

Length: .93 to 1.09 mm.

Coloration similar to that of the female (and practically identical with the male of *schittieri*) but the face except in the scrobes has a greenish luster instead of deep blue, and the metallic luster except on the head, the scutellum and metapleura is somewhat weaker, especially on the dorsum of the abdomen.

Described from 4 females (type and paratypes) collected on weeds infested with *Saissetia nigra* (Nietner), Honolulu, Oahu, July 7, 1916 (Timberlake); 7 females, 5 males (paratypes) reared from the same host, Honolulu, May 22 to June 6, 1919 (Timberlake); 2 females (paratypes, one with head missing) reared from *Scutellista cyanea* Motschulsky, Honolulu, Feb., 1906 (Kotinsky); 2 females (paratypes) reared from *Asterolecanium* species on bamboo, Honolulu, Sept., 1905 (Kotinsky); 2 females, 1 male (paratypes) reared from *Asterolecanium pustulans* (Cockerell), Honolulu, Dec., 1915 (Ehrhorn); 1 male (allotype) reared from the above Coccid, Diamond Head, Oahu, April 7, 1918 (Swezey); 3 females (paratypes) reared from *Coccus viridis* (Green) on coffee, Kona, Hawaii, Dec., 1915, Aug. 25, 1916, and Sept. 8, 1916 (Pemberton); 1 male (paratype) reared from *Saissetia hemisphaerica* (Targ.), Kona, Hawaii, Dec., 1915 (Pemberton); and 1 female (paratype) on *Dodonaea*, Kilauea, Hawaii, June 27 1917 (Swezey).

This species is parasitic in various Coccids, but I have no doubt that it is always secondary. In the *Asterolecanium* it works undoubtedly on *Tomocera californica* Howard and in *Saissetia* and *Coccus* it probably parasitizes *Microterys kotinskyi* (Fullaway) and possibly both species of *Encyrtus*, as well as the *Scutellista* and *Tomocera*.

Coelopencyrtus n. g.

Female: Head as wide as the thorax, moderately thin fronto-occipitally, strongly convex above, the occiput slightly concave with the neck inserted near the center, the face inflexed; in side view subtriangular, the facial side hardly longer than the dorsal, the oral angle truncate; in frontal view subcircular, the cheeks but slightly converging below, the oral margin broad and slightly produced medially; frontovertex about two and a half times as long as wide, perceptibly widened at either end and narrowest at the middle; ocelli in a strongly acute-angled triangle, the anterior ocellus at the center of the frontovertex, the posterior pair almost touching the eye-margins and remote from the occipital margin; eyes medium-sized, strongly convex and nearly round except that the posterio-ventral orbits are nearly straight; cheeks somewhat longer than half the diameter of the eyes; face about as wide as long, and as long as the eyes, with a nearly semicircular depression forming the scrobes not quite reaching laterally to the lower orbits of the eyes and divided below by a broad, slightly elevated prominence between the antennae. The latter inserted near the oral margin and widely separated, rather small and subclavate; scape slender and moderately thickened apically; pedicel slightly thicker at apex than the following joint and almost as long as the first four funicle joints combined; funicle increasing slightly in thickness distad, the first four joints subequal, transverse, the last two about twice as long as the preceding joints and quadrate, the sixth a little larger than the fifth; the three-jointed club large, oval, much broader than the funicle and as long as the four preceding joints combined. Mandibles medium-sized, strongly depressed, broad at base and with three acute teeth at apex, of which the ventral one is much the longest, the upper one smallest. Maxillary palpi four-jointed, the apical joint slenderly fusiform and nearly as long as the three preceding joints combined; labial palpi two-jointed with the apical joint shorter and slenderer than the first.

Thorax rather robust, moderately convex above, the sclerites of the mesonotum lying in one plane; pronotum short, slightly arcuate; scutum large, about twice as wide as long; axillae short, transverse, and nearly meeting medially; scutellum large, broadly rounded at apex, somewhat longer than wide, the disk flattened but the sides and apex highly elevated and strongly declivous; propodeum short at the middle and moderately long at the sides. Abdomen somewhat more than half as long and a little wider than the thorax, as wide as long, very broadly ovate and

subcordate at base, very strongly depressed, the vibrissal plates situated about half way between the middle and the base; ovipositor very short, not protruded, and enclosed by the fifth ventrite which reaches to the apex but is not at all compressed.

Legs of usual length and without special modifications; the middle tibiae moderately enlarged at apex, the spur as long as the first tarsal joint; the middle tarsi thicker than the other tarsi. Wings with the costal cell wide; the discal ciliation moderately dense, sparser on the basal part before the narrow speculum; marginal fringe very short and thick; marginal vein nearly punctiform or slightly longer than thick; stigmal moderately long or about equal to the marginal and postmarginal veins combined, somewhat enlarged at apex with a spur on the upper side, postmarginal about two-thirds as long as the stigmal; hind wings with the costal cell nearly absent.

Head and thorax very finely reticulate, the abdomen slightly more coarsely reticulate, all parts, especially head and notum, strongly shining; frontovertex with a few scattered, minute and shallow pin-punctures, the mesonotum with minute, seriated, setiferous punctures. Eyes with a fine, rather thick pubescence; rest of head with longer, moderately thick pubescence; mesoscutum and scutellum with numerous seriated, bristle-like hairs; abdomen finely, sericeously pubescent especially on the sides and apical margin; the pubescence blackish throughout and not conspicuous. Coloration metallic bluish and greenish black.

Male: Similar to the female except in the very peculiar and highly specialized head. This is a little longer than wide and subcircular in frontal view, very thin towards the mouth fronto-occipitally and gradually thickening above where it becomes about three times as thick as at the oral margin, the dorsal surface very strongly convex; frontovertex nearly as wide as long, with the frons very prominent and protuberantly produced forward beyond the eyes; the ocelli arranged in a large, equilateral triangle, the anterior one on a line with the anterior dorsal corners of the eyes, the posterior pair close to the eye-margins and remote from the rounded occipital margin; eyes subtriangular with the posterior orbits rounded; cheeks as long as the eyes; face strongly produced upward beyond the eyes and joining the frons in an acute angle, strongly obliquely reflexed and concave from the frontal angle to the antennal sockets as seen in side view, the upper part between and beyond the eyes flat from side to side, the remaining part above the antennae concave from side to side, the part below the antennae moderately convex.

Antennae inserted very far apart on the outer margins of the face next to the cheeks, and half way between the base of the mandibles and the eyes; short and strongly clavate; scape very short and inerassate, but little longer than thick, reaching not more than one-third of the distance to upper margin of face, in cross-section subtriangular, the lower side slightly hollowed to receive the pedicel, the other two sides convex, the outer margin in outline straight, the inner margin forming an arc

somewhat less than a semicircle; pedicel quadrate and somewhat longer than the first funicle joint; funicle joints no longer than wide and mostly transverse, increasing in width distad; the first narrowly transverse with a short, lamelliform projection at base on dorsal side and then obliquely sloping to apex; the second joint a little wider than long, the following two slightly narrower and about as wide as long; the last two joints increasing in width but not in length, the sixth nearly twice as wide as long; club solid, large, very broadly oval and rounded at apex, inclined somewhat obliquely to the funicle, not much longer than wide and as long as the last three funicle joints combined.

Frontovertex somewhat more rugulosely reticulate than in the female, with the same scattered, minute punctures; upper part of the face somewhat smoother and more shining, with a delicate, fine reticulation, and more thickly punctate than the frons, becoming somewhat polished medially just above the antennae and without a median carina; the sides of the face in a distinct area above the antennal sockets and reaching upwards narrowly to the eyes much more rugulosely shagreened than the rest of face, or closely, longitudinally lineolate next to the cheeks and eyes, more irregularly lineolate medially below, the sculpture on the whole being somewhat fingerprint-like; on each side near the middle of the face contiguous to the peculiarly sculptured area is a slight impression, small and circular; the convex part of the face below the antennae somewhat smoother than the dorsal part of the face, but with a similar reticulation.

Upper part of face with a dense, moderately long, erect, fine pubescence; the rest of face and frontovertex with a shorter, sparser pubescence; pedicel and first funicle joint with a short, dense, silky pubescence on the upper side, the following joints rather densely, and uniformly pubescent with fine, slightly longer hairs.

Genotype: *Coelopencyrtus odyneri* n. sp.

Besides *odyneri* there is at least another species present in the Islands which differs in the male sex in having a median carina on the face just above the antennae, the pedicel wider than long, and the first two funicle joints very short, transverse and produced on the outer side into short rami.

The species of *Coelopencyrtus* are parasitic in the larvae of *Odynerus*, many of the parasites issuing from a host, which becomes inflated and filled with cells somewhat like lepidopterous larvae which have been parasitized by *Copidosoma*. The species may therefore be polyembryonic, although both sexes usually issue from the same host, which could hardly be the case if all developed from a single egg.

In the female sex *Coelopencyrtus* is similar to *Ageniaspis*, and is apparently most closely allied to that genus but differs in the venation, sculpture, pubescence, etc., while the male because of its peculiar head is entirely different from any genus described in the family. In Ashmead's tables *Coelopencyrtus* (together with *Ageniaspis*) agrees best with the polyembryonic *Copidosoma* group, and runs to *Prionomitus* Mayr which probably does not really belong to this group.

Coelopencyrtus odyneri n. sp.

Female: Structural characters as given in the generic description.

Length: 1.10 to 1.47 mm.

Head blue-black with a metallic purple and greenish luster; mesoscutum strongly metallic green-black, the rest of the thorax and the abdomen black, shining but not metallic except that the axillae and scutellum have a comparatively weak and mostly bluish luster; mandibles brown, the palpi yellow. Antennae black, the flagellum appearing grayish brown on account of the pubescence mostly. Legs black, with the tibiae more fuscous; trochanters, tibiae narrowly at each extremity, and tarsi of front legs, the hind tibiae along the ventral and apical margin and the hind tarsi brownish; trochanters, femora at base, tibiae except towards the base and the tarsi of the middle legs brownish yellow. Wings hyaline with a slight smoky cast most prominent on the basal half, the veins fuscous.

Male: Structural characters as given under the generic heading.

Length: 1.27 to 1.53 mm.

Coloration as in the female except that the frontovertex and the upper part of the face are duller greenish black with a weaker not at all bluish luster, the flagellum more strongly brownish.

Described from 125 females, 2 males (type, allotype and paratypes) reared Feb. 22-23, 1916, from a larva of *Odynerus nigripennis* (Holmgren) collected Feb. 6, Waialae, Oahu (Swezey), and 25 females, 3 males reared April 2-5, 1916, from the same host in reproduction from a female of the above lot (Timberlake). The males in each case issued a day in advance of the females; from the first host a total of 2 males and 136 females (besides 2 or 3 more that escaped) issued and from the second 3 males and 49 females.

Coelopencyrtus swezeyi n. sp.

Ageniaspis species, Swezey, Hawaiian Sugar Planters' Exp. Sta., Ent. Bull. 5, 1907, p. 52, pl. 6, fig. 6.

Female: In structure and coloration hardly distinguishable from *C. odynerі*, but the pubescence on the head slightly thicker and rather longer on the frontovertex, the pleura often somewhat brownish, the frontovertex in the typical series from Hawaii strongly metalic purple but in the Oahu series rather duller than in *odynerі* and inclining to greenish.

Length: .96 to 1.49 mm.

Male: Differs from the male of *odynerі* in having the head a little thinner above or hardly over twice as thick dorsally as at the oral margin; the frontovertex fully as wide as long with the frons rather more protuberant; anterior ocellus much closer to the anterior margin of the frons, the ocelli otherwise arranged the same; the face with a median carina above the antennae; the area of differentiated sculpture above the antennal sockets regularly and closely lineolate medially and more irregularly lineolate towards the eyes. Scape somewhat narrower with its outer margin slightly but distinctly arcuate; pedicel strongly produced on the outer side so that it is twice as wide as long and subquadrangular as seen from above; flagellum much shorter; first funicle joint thinly discoidal, being very short and transverse, produced upward and also on the outer side into a short ramus; second joint short and transverse but not discoidal, produced on the outer side but not upward, its ramus somewhat shorter than the first; next two joints about twice as wide as long, the third subproduced laterally; last two funicle joints longer and somewhat wider than the fourth, the sixth about a half wider again than long; club nearly as in *odynerі* although somewhat smaller. Pubescence on the upper part of the face slightly longer and the tuft of fine, short hair on the pedicel somewhat thicker. Coloration as in *odynerі* with the pleura and antennae more brownish, the apex of the flagellum becoming distinctly brown.

Length: 1.05 to 1.38 mm.

Described from 61 females, 11 males (type, allotype and paratypes) reared from *Odynerus nigripennis* (Holmgren) Pahala, Hawaii, Dec. 7, 1905 (Swezey); 2 females (paratypes) taken on a rock near an *Odynerus* nest, Pahala, Hawaii, Dec. 7, 1905 (Swezey); 40 females, 8 males (paratypes) reared from *O. nigripennis*, Tantalus, Oahu, Dec. 20, 1908 (Giffard); and 56 females, 4 males (paratypes) found dead in *Sceliphron* cells occupied by *O. nigripennis*, Makiki Valley, Oahu, Jan. 16, 1916 (Swezey and Timberlake).

From the Pahala *Odynerus* larva Swezey reared 101 parasites in all, and Giffard reared aproximately 275 from three larvae.

Nesencyrtus n. g.

Closely allied to *Coelopencyrtus* and similar except as follows:

Female: Head considerably shorter and thicker, in frontal view noticeably wider than long, subquadrate with the dorsal margin rounded, the oral margin truncate; in side view with the cheeks very thick at the oral margin fronto-occipitally, or nearly one-half as thick as the head at the anterior corners of the eyes; frontovertex rather wide and one-half as wide as long; ocelli in a nearly equilateral triangle, the anterior one not far behind a line connecting the anterior corners of the eyes, the posterior pair close to the eye-margins and rather remote from the occipital margin; eyes relatively smaller with the anterior and dorsal orbits much less rounded; face broader, the scrobal impression not reaching quite so far upwards towards the eyes, the elevation between the antennae a little more prominent, the clypeus broadly produced medially as in *Coelopencyrtus* and nearly discreted as a separate, narrowly transverse sclerite projecting over the mouth-opening; cheeks as long as their own width above or as long as the width of the eyes. Antennae much shorter and very strongly clavate; the scape moderately long, reaching to the upper limit of the face and including the radicle as long as the flagellum, compressed and slightly expanded below, with an excavation on the apical half of the under side to receive the pedicel; the latter strongly thickened at apex, wider than the first and somewhat longer than the first three funicle joints combined; funicle joints all much shorter than wide, increasing strongly in width distad and slightly in length, the sixth nearly twice as wide as the first; club large, broadly oval, rounded at apex, much wider than the funicle and about as long. Mouth-opening very large to accommodate the unusually large mandibles; these are flattened, somewhat curved inward apically, the apex hardly narrower than the base with three strong, acute teeth, the inner tooth somewhat shorter and blunter. Maxillary palpi somewhat shorter, the apical joint considerably shorter than the three preceding joints combined.

Thorax somewhat more depressed, the scutellum less strongly elevated and declivous at the sides especially towards the apex; the axillae meeting medially, abdomen similar, the ovipositor internally longer, and slightly protruded. Wings and legs practically the same; sculpture and pubescence similar to *Coelopencyrtus*.

Male: Head much thinner than in the female, the frons not protuberantly produced beyond the eyes as in *Coelopencyrtus*; frontovertex a little wider than long; ocelli in a right-angled triangle, the posterior pair

nearly touching the eye-margins and not much more than their own diameter from the slightly rounded occipital margin; face no longer than wide and not produced upward beyond the eyes as in *Coclopencyrtus*, although strongly concave lengthwise above the antennae. The latter inserted slightly further apart than in the female although hardly higher up on the face, somewhat longer than in *Coclopencyrtus*, not clavate, but with the first four funicle joints shortly ramose on the inner side; scape much longer, not triangularly thickened but on the contrary rather strongly compresesd and somewhat dilated below, with a groove on the outer surface to receive the pedicel; the latter triangular and no longer than wide at apex, the first funicle joint longest, the last two but little shorter, the first four much wider than long, being produced on the inner side into moderately long rami, of which the third is longest, the first shortest; last two funicle joints subtriangular, narrow at base and somewhat wider at apex than long; club solid, oval, no wider than the preceding joint and a little shorter than the last two funicle joints combined.

Sculpture similar to that of *Coclopencyrtus* male, but the area above the antennal sockets not nearly so distinctly differentiated, being extremely finely lineolate; on each side of the middle of the face contiguous to these areas is a lunulate or subangular impression where the separate curvatures of the lower and upper parts of the face meet; these impressions are highly polished and shining and are separated medially by a smoothish, slight ridge, which widens a little above but soon becomes obsolete. Pubescence about as in *Coclopencyrtus;* the pedicel shortly, rather densely pubescent on the upper side, the following joints with much longer, rather abundant pubescence, which is also present on the rami.

Genotype: *Adelencyrtus kaalae* Ashmead.

This genus is only remotely related to *Adelencyrtus* in which Ashmead placed his species, and hardly resembles it even superficially, although it must be remarked that *Adelencyrtus* even at its inception was not at all homogeneous.

Nesencyrtus kaalae (Ashmead).

Adelencyrtus kaalae Ashmead, Fauna Hawaiiensis, 1, Pt. 3, 1901, p. 323.

The male, hithertofore unknown, closely resembles the female except in the points brought out in the generic description.

I have examined 4 females from Oahu: Tantalus (Giffard), Opaeula and Kalihi (Swezey), and one determined by

Ashmead from Kaala (Perkins); also many specimens from Kilauea, Hawaii, one female taken by Swezey, the rest including both sexes reared from larvae *Nesoprosopis pubescens* Perkins, found nesting in an old rotten log (Williams).

Aphycomorpha n. g.

Most closely related to *Aphycopsis* Timberlake and *Anagyropsis* Girault, although very similar to *Aphycus* Mayr

Female: Head a little wider than long, rather thick, the cheeks convergent towards the truncate mouth, the face reflexed, the frons rather narrow and not prominent; eyes rather small, very broadly oval; frontovertex two and a half times as long as wide at the middle, being widened both anteriorly and posteriorly; ocelli arranged in an acute-angled triangle, the anterior one at the center of the frontovertex, the posterior pair almost touching the eye-margins and remote from the occipital margin; face and cheeks as long as the eyes, the scrobes in the form of a triangular impression divided below by a median, moderately elevated ridge between the antennae. Antennae inserted close to the clypeal margin and formed much as in *Aphycus*; the scape compressed, but not expanded beneath; the pedicel about as long as the first three funicle joints combined; funicle joints all a little wider than long, increasing distinctly in width and more slightly in length distad; the club large, oval, wider than the funicle and as long as the five preceding joints combined. Mandibles with an acute ventral tooth, and a broad dorsal one.

Thorax robust, the dorsum slightly convex; the collar of pronotum short, narrowly transverse and scarcely arcuate; mesoscutum nearly twice as wide as long, the posterior margin slightly sinuate on either side of the middle which is slightly produced caudad; axillae much wider than long and nearly meeting at the middle; scutellum very large, somewhat longer than wide, the sides slightly rounded in outline and strongly declivous, the apex rounded; propodeum very short at the middle and not greatly enlarged laterally. Abdomen very small, scarcely one-half as long as the thorax, depressed, triangular with the basal corners rounded and the apex rather acute; the vibrissal plates situated a little before the middle just within the lateral margin on the ventral side; fifth ventrite reaching half way between the middle and apex; ovipositor internally reaching nearly to the base of the abdomen, apically free beyond the fifth ventrite and slightly protruded.

Legs stout, moderately long, the middle tibiae much enlarged at apex and the middle tarsi strongly incrassate. Discal ciliation of wings dense and uniform, the speculum widened below, marginal fringe short and dense; submarginal vein broken where it joins the thickened apical part, the basal portion with six long bristles which gradually shorten on either side of the longer middle ones; marginal vein nearly twice as

long as thick, the stigmal moderately long, straight, slender with the apex much enlarged, the postmarginal as long as the slender part of the stigmal.

Sculpture of the head very finely alutaceous and opaque; the thorax slightly shiny and microscopically reticulate; the abdomen more shining and more coarsely reticulate. Eyes with a short, rather thick pile; the frontovertex with a very fine, inconspicuous blackish pubescence; collar of pronotum and the mesonotum with much coarser, black bristle-like hairs arranged more or less seriately on the scutum and scutellum. Coloration non-metallic yellowish.

Male: Head considerably thinner than in the female, the eyes smaller; the frontovertex somewhat wider than long; ocelli arranged in a right-angled triangle, the posterior pair situated rather close to the eyes and the occipital margin. Antennae inserted higher up on the face yet below the level of the eyes; the scape similar, the pedicel short and thick, or hardly longer than wide, the flagellum elongate, not thickened distad and with long subverticillate hairs which are much shorter on the under side; funicle joints all about equal in length and twice as long as wide, deeply incised on the upper side at the articulations; club solid, elongate elliptical, acute at apex, somewhat shorter than the last two funicle joints combined and no wider, the abundant hairs gradually shortening towards the apex.

Thorax, abdomen, legs and wings about as in the female; the abdomen fully as large as in the female; the middle tarsi not much thickened at base although attenuated towards apex, yet nevertheless much more robust than the front or hind tarsi.

Sculpture somewhat similar although the frontovertex is a little more coarsely and rugulosely alutaceous and the mesonotum is very finely and closely rugulosely reticulate; pubescence the same yet much less conspicuous as it is concolorous with the black head and thorax.

Genotype: *Aphycomorpha araucariae* n. sp.

This genus differs from *Anagyropsis* in having the scape narrow, not broadly expanded beneath, in the more opaque, alutaceous and less reticulate sculpture, and in having the general form of the body much less robust. From *Aphycopsis* it differs in having the frontovertex much narrower, the oral margin of face truncate instead of distinctly emarginate, in the compressed, non-clavate scape, in the broken submarginal vein, and the somewhat longer marginal. These three genera all agree in the shape of the mandibles.

Aphycomorpha araucariae n. sp.

Female: For the structural characters consult the generic description.

Length, .70 to 1.03 mm.

Head, pronotum, metanotum, propodeum and underparts of thorax primuline yellow (Ridgway), a little brighter on the occiput and face, the vertex often darker or nearly like the mesonotum; the latter and the tegulae ochraceous orange (Ridgway); abdomen brownish black with the dorsal apical margin yellowish, the venter blackish or at least dusky in the center, yellowish at apex beyond the fifth ventrite, the base broadly yellow at the middle and more narrowly yellow at the sides. Antennae dusky yellow becoming more infuscated on the first two funicle joints, the club brownish black; legs concolorous with underparts of thorax, the apex of the last joint of the tarsi blackish. Wings hyaline with a slight or inconspicuous smoky cloud on basal half extending to the apex of the stigmal vein, more distinct just below the stigmal and the break in the submarginal vein, and enclosing below the apex of the submarginal a clear oval area which includes the speculum and extends two-thirds of the way across the disk; the veins fuscous.

Male: Structural characters as given under the generic heading

Length: .88 to 1.05 mm.

Coloration black, the thorax and abdomen slightly shining, the head opaque; the face brownish black with the prominence between antennae, the oral margin and the mandibles yellowish brown. Scape dusky yellow, the pedicel and flagellum translucent fuscous with a yellowish cast; front and middle legs nearly as in the female, the hind legs blackish brown with the trochanters, apex of the tibiae and the tarsi brownish yellow. Wings entirely hyaline, the veins fuscous.

Described from 5 females (type and paratypes) reared from *Eriococcus araucariae* Maskell, Moanalua Gardens, Oahu, near Honolulu, May 1-7, 1918 (Timberlake); 18 females, 9 males (allotype and paratypes) from the same host and locality, May 26 to June 12, 1919 (Timberlake); and 4 females, 3 males (paratypes), reared from the same host, Honolulu, Nov. 24 to Dec. 1, 1917 (Fullaway). The oldest specimens examined are three females and a male reared from the same host at Honolulu, July, 1906 (Kotinsky) but they are too much broken to serve as paratypes.

Anicetus annulatus n. sp.

Female: Head considerably wider than long and wider than the thorax; the dorsal surface transversely suboval, horizontal and only slightly convex from side to side; eyes rather broadly suboval, the inner orbits nearly straight and moderately arcuately diverging anteriorly; fronto-

large and arranged in an acute-angled triangle, the anterior one somewhat behind the center of the frontovertex, the posterior pair about one-half their own diameter from the eye-margins, a little over their own diameter apart and nearly twice as far removed from the occipital margin; cheeks fully as long as the eyes and very strongly convergent towards the mouth; the face wider than long, strongly obliquely reflexed and meeting the frons in an acute and carinated angle, which is nearly transverse between the eyes and curved forward and downward in front of the eyes to separate the face and cheeks for a short distance, upper part of face rather deeply concave and divided by a broad median elevation ascending from between the antennae. The latter inserted far apart, a little less than half way from the oral margin to the eyes; scape compressed, dilated beneath, triangular in shape, with the base narrow, the apex broad, the apical corners rounded; pedicel somewhat longer than the first three funicle joints combined, about three-fourths as wide at apex as the sixth funicle joint, triangular with the apical ventral corner produced forward and downward so that the ventral margin is noticeably longer than the dorsal, and the apical margin slightly concave; funicle joints all very short and transverse or foliaceous as taken together, the first joint the longest medially, the sixth much longer on the dorsal margin than any of the preceding, the first but slightly narrower transversely than the sixth; club very large, compressed and obliquely truncate on the apical margin about one-half the way to the base, somewhat wider than the funicle and as long as the funicle and pedicel combined, the sutures, especially the one between the second and third joints, obsolete.

Thorax considerably wider than its depth, the notum moderately convex; pronotum very short, transverse and somewhat arcuate, mesoscutum not quite twice as wide as long, its posterior or basal margin nearly straight; axillae short, transverse, nearly or actually meeting medially; scutellum large, a little longer than the scutum or its own width, rather broadly rounded at apex, the sides a little rounded and but slightly elevated or declivous; propodeum very short at the middle, rather long at the sides and obliquely declivous from the base towards the apex, metapleura oblique, rather small and somewhat narrowed below where touching the hind coxae. Abdomen slightly wider than the thorax and two-thirds as long, strongly depressed, very broadly ovate or approaching rotundity, widest just before the middle where the vibrissal plates are situated, the basal corners rounded, the apex obtusely angled or rounded, the ovipositor barely protruded.

Legs rather short; the middle tibiae not much enlarged at apex, the spur as long as the first tarsal joint; the middle tarsi considerably stouter than the other tarsi but not incrassate, cylindrical and not tapering towards apex. A large central area of the disk of fore wings strongly inflated from below as in related species, the area reaching about one-eighth of the wing-length from apex, its apical margin semicircular; disk finely, moderately densely ciliated, the basal part with a group of much coarser or bristle-like hairs just before the speculum and extending a vertex two and a half times longer than the width at the ocelli; the latter

little more than half way across the disk; the base before these bristles and a narrow longitudinal area beneath the apical part of the venation bare; speculum reaching from the latter area obliquely to the basal area, much narrowed above and overhung by the bristle-like hairs; marginal fringe rather short and moderately dense; marginal vein about twice as long as thick, equal to the stigmal, the postmarginal somewhat shorter and forming an acute angle with the stigmal; marginal and postmarginal veins with a row of six bristle-like hairs of which the one at the apex of the postmarginal is much the longest.

Head, abdomen and thorax except the scutellum smooth and highly polished, the scutellum with an extremely minute, granular alutaceous sculpture; surface of the antennae rather opaque, the scape with relatively coarse reticulations. Eyes with a short, fine and rather thick pile; frontovertex with four rows of very fine, but rather long, pale-colored hair of which the orbital rows are inclined forward, the others backward; mesoscutum with similar, sparse, scattered hairs, the apical margin near the middle with a pair of longer, bristle-like black hairs; scutellum with two pairs of still stouter, longer black bristles, one pair near apex, the other but slightly further apart just behind the middle, the disk also with a few fine hairs. Dorsal margin of the pedicel and flagellum and the ventral apices of the pedicel and funicle joints provided with numerous, black, bristle-like hairs, the sides of the club with similar, shorter hairs.

Length: .78 to 1.18 mm.

General color of head, thorax and venter about ochraceous orange (Ridgway); the face and cheeks paler yellow with a rathe, wide transverse fuscous to blackish band across their middle, passing through the base of the antennae and curving upward on the median facial prominence; an oblique band on each side of the prosternum extending forward from the coxae, black; frontovertex, mesoscutum and mesopleura washed with a distinct but not very strong purplish luster; propodeum and metanotum blackish on each side of the middle, the metapleura with an oval to oblong spot on the upper part, brilliant, metallic, pale green; abdomen except the venter black with a bluish luster medially at the base, the sides on the basal half brilliant, bright green, the sides very broadly on the apical half about antimony yellow (Ridgway). Antennae concolorous with the frontovertex, the radicle joint and ventral margin of the scape narrowly black. Legs somewhat paler yellow than the thorax with the apex of the tarsi, the first joint of the hind tarsi and two annuli on the hind tibiae black, the first tibial band situated close to the base, the second just beyond the middle. Wings subhyaline; a broad area across the disk opposite the apical third of the venation and the extreme base smoky; apical part of disk beyond the venation slightly infuscated and more deeply so in a narrow band encircling the inflated area, leaving the apical margin clear; veins yellowish with the marginal more brownish.

Male: Much different from the female and considerably like the male

of *Ceratocerus*: head in general shape similar to the female but much thinner and the frons not so prominent; frontovertex slightly wider than long, the ocelli in a nearly equilateral triangle, the posterior pair about their own diameter from the eye-margins and the occipital margin; cheeks considerably longer than the eyes and very strongly convergent towards the mouth; face wider than long, obliquely reflexed and meeting the frons in an acute angle, with a prominent median ridge from the oral nearly to the frontal margin, and deeply, somewhat triangularly hollowed on either side of the ridge. Antennae inserted moderately far apart near the middle of the face nearly on a line with the anterior corners of the eyes, the scape very short, excluding the radicle no longer than the pedicel and the first funicle joint combined, compressed and twice as long as wide; pedicel no longer than thick; flagellum slender and elongate, not thickening towards the apex, the funicle joints with long, subverticillate hairs, the club with similar scattered hairs shortening towards the apex; the first funicle joint somewhat longer than the second to fourth, the last two still longer, the first a half longer than wide, the fifth about twice as long as wide, the sixth a little shorter, each, especially the second to the fifth, deeply incised at the articulations so that the second to fourth are subtriangular; club nearly as long as the last two funicle joints combined, narrow, acute at apex and solid.

Mesoscutum much larger than in the female and much longer or hardly a fourth wider than long; axillae triangular, being longer and not so wide and more distinctly separated medially; scutellum much smaller or no longer than wide and much shorter than the scutum; abdomen about the same as in the female although hardly wider than the thorax and less rounded on the sides. Wings much wider and shorter; the disk not inflated and uniformly ciliated, with the cilia before the speculum but slightly larger and extending in a group across the disk, the basal bare area much smaller; the marginal, postmarginal and stigmal veins all shorter but keeping about the same proportions to each other.

Face shining and very finely or microscopically reticulate; frontovertex finely, closely granular and rather opaque; mesoscutum finely, transversely reticulate, sometimes appearing minutely rugulose, and but slightly shiny; scutellum crowded with fine granular reticulations somewhat longitudinally lengthened, appearing velvety opaque in some lights and metallic in others, the declivous part of the apical margin becoming smooth and polished; axillae, propodeum, pleura and abdomen comparatively smooth and shining. Pubescence except on the eyes more abundant than in the female; frontovertex with six rows of fine hairs inclined backward, and a few hairs on the occipital margin inclined forward; the pubescence on the mesoscutum more distinctly arranged seriately; the fine hairs on base of scutellum longer, the anterior pair of bristles more widely separated.

Length: .68 to .86 mm.

General color black and weakly metallic in large part; frontovertex brown; the face with a slight greenish luster; scutellum slightly metallic;

greenish in some lights and more strongly so on the apical margin; mesopleura with a rather strong purple luster, the metapleura strongly metallic green; the abdomen slightly bluish black and shining. Scape and pedicel blackish, the flagellum dusky yellow with the verticillate hairs black. Front and middle legs pale yellow, the front tibiae broadly at the middle and the basal third of the middle tibiae fuscous; hind legs fuscous, the tibiae more blackish, the trochanters, the tibiae narrowly at base and on the apical fifth, and the tarsi pale yellow; apex of all the tarsi black. Wings entirely hyaline, the veins mostly yellowish, the marginal vein fuscous.

Described from 2 females, 3 males (type, allotype and paratypes) reared from *Eucalymnatus tessellatus* (Sign.), Honolulu, Oahu, Nov. 26 to Dec. 1, 1917 (Fullaway); 1 female (paratype) supposed to have been reared from *Saissetia hemisphaerica* (Targ.), Honolulu, April 25, 1912 (Fullaway); 1 female (paratype) collected on *Cyrtandra*, Nin, Oahu, Feb. 1, 1914 (Swezey); and 3 females, 1 male (paratypes) reared from *Eucalymnatus tessellatus*, Puu Kapele, Kauai, Feb. 14 1915 (Swezey).

Examination of the host remains mounted with the Kauai specimens indicates that the parasite is unquestionably a primary parasite and that only one issues from the nearly full-grown scale. The record from *Saissetia* needs confirmation before being accepted.

OFFICERS ELECTED FOR 1919.

President.....W. M. Giffard
Vice-President.....D. L. Crawford
Secretary-Treasurer.....D. T. Fullaway

Messrs. Muir and Giffard were appointed a Committee to consider desired changes in the Constitution and By-Laws.

The Treasurer reported a balance in the treasury of $57.38.

Miscellaneous Notes and Exhibits of Insects Collected at Puuwaawaa, North Kona, and Kilauea, Hawaii.*

BY W. M. GIFFARD.

The following exhibits were collected on a short visit to Puuwaawaa, North Kona, Hawaii, August, 1917.

Rhynogonus sp.—One specimen collected on *Acacia koa* in the mountains at an elevation of approximately 3800 feet. It is the first specimen of this genus to be collected on the Island of Hawaii. It was sent to Dr. Sharp who has described it as new under the name *R. giffardi.* (See page 80 of this issue of the Proceedings).

Clytarlus nodifer.—Four perfect specimens collected on *Acacia koa.*

Calandra oryzae.—Two specimens of this common domestic grain weevil collected on *Acacia koa.* This is apparently the first record of this insect being taken in the high forest regions. Possibly it may attack the seeds of *Acacia koa* but the trees in this locality were not noticed to be in fruit at the time.

From a few seeds and seed pods with stalks attached of the rare *Hibiscadelphus hualalaiensis* collected on this visit by Mr. J. F. Rock, I bred out the following aggregation of insects:

Lepidoptera.—Four specimens of the pink boll-worm *(Pectinophora gossypiella).*

Parasitic Hymenoptera.—One specimen of *Spalangia* sp., probably *simplex* which parasitizes small Diptera.

One specimen of *Angitia blackburni.*

Diptera.—One specimen (undetermined).

Neuroptera.—Two Psocids (undetermined).

Hemiptera.—One *Nysius* sp. (undetermined).

Coleoptera.—Two specimens of Anobiids (2 undetermined species).

*These notes were presented by Mr. Giffard at the October, 1917, meeting, but were inadvertently omitted from the records and thus missed being printed in the Proceedings for 1917. As considerable importance is attached to some of them, they are printed at this time. —[Ed].

Eleven *Proterhinus* (2 undetermined species).

NOTE:—It is interesting to note that *Pectinophora gossypiella* attacks the seeds of *Hibiscadelphus* and is not confined (as Mr. Busck has stated) to *Gossypium*. The *Hibiscadelphus* are indigenous but exceedingly rare in our native forests, and whilst a species of so-called "red cotton" (*Kokia Rockii*) is sparsely distributed in the forests of one section of North Kona, yet it is not the true cotton and Mr. Rock informs me that on many visits to the region he has never noticed that the "red cotton" bolls were ever attacked by anything approaching *Pectinophora*. Mr. Busck however records the fact that Lefroy has bred it from *Hibiscus* (an ally of *Hibiscadelphus*) in India.

It was also interesting to note that one can breed out of the stalks and seed pods of *Hibiscadelphus* so many insects of various Orders, although it may be taken for granted that some of these are more particularly attached to other trees than the particular one referred to.

From the flower heads of *Raillardia ciliolata* collected at Kilauea, October, 1917, a good series of the following insects were bred:

Diptera.—*Tephritis* sp., a good series of an undetermined species.

Homoptera.—*Nesosydne raillardiae*, one nymph.

Parasitic Hymenoptera.—Eight *Phanurus vulcanus* Perk. This is probably parasitic on the eggs of a bug (*Nysius* sp.), as Mr. Swezey in examining the flower heads found several empty bug eggs similar to *Nysius* eggs previously found by him in the flower heads of *Bidens*.

Two Eulophids (*Tetrastichus* sp.). These issued from puparia of the *Tephritis* as Mr. Swezey found, on later examination, two puparia having exit holes made by some parasite. Mr. Timberlake examined these *Tetrastichus* specimens and pronounced them as belonging to an undetermined species. It is apparently a native insect, and the first native species of the genus to be recorded in the Hawaiian Islands.

Mailed July 15, 1919

CONTENTS OF VOL. IV, No. 1

Paradise Print

VOL. IV., No. 2. JUNE, 1920.

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1919

HONOLULU, HAWAII

PRICE 50 CENTS

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All correspondence should be addressed to the Secretary, Hawaiian Entomological Society, Honolulu, Hawaii, from whom copies of the Proceedings may be purchased.

Volume I of the Proceedings, for 1905-07 (in five numbers), contains 210 pages, 4 plates, and 5 text figures.

Volume II, 1908-12 (in five numbers), contains 311 pages, 7 plates, 5 cuts and 1 portrait.

Volume III, 1913-1917 (in five numbers), contains 500 pages, 8 plates and 6 cuts.

Volume IV, No. 1, 1918, contains 233 pages, 4 plates and 6 cuts.

Price per volume, $2.00. Price of any single number, 50 cents.

PROCEEDINGS

OF THE

Hawaiian Entomological Society

Vol. IV, No. 2. For the Year 1919. June, 1920.

JANUARY 2nd, 1919.

The 160th meeting of the Society was held in the Entomological Laboratory of the Experiment Station of the Hawaiian Sugar Planters' Association, President Giffard in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Grimmell, Muir, Rosa, Swezey, Timberlake, Willard and Williams.

Minutes of previous meeting were read and approved.

Obituary.

Harold Oscar Marsh.

The October (1918) number of the *Journal of Economic Entomology* notes the death at Chester, N. J., Sept. 10, 1918, of H. O. Marsh, who was a member of this Society from October 6th, 1910, to February, 1911, at which time he returned to the mainland on account of ill-health.

According to the obituary notice in the *Journal*, Mr. Marsh was born November 6th, 1885, was educated in the public schools of Chester, N. J., and took a special course in entomology at the Kansas Agricultural College in 1911. His first employment was with the State Horticultural Boards in New Jersey and Pennsylvania. Later he joined the staff of the U. S. Bureau of Entomology. In the Bureau service he worked

mostly on truck crop insects in the South and West. While in Honolulu (July 1910 to February 1911) he was Assistant Entomologist at the Board of Agriculture and Forestry. His work in Hawaii was almost entirely practical, consisting of experiments with different spraying mixtures applied to the control of some of our field crops and vegetable pests. However, considerable biological work was carried on at the same time, and his accounts of the beet webworm and the imported cabbage webworm, published by the Bureau, are excellent in every way.

Publications on his work here are the following:

"Report of the Assistant Entomologist." Bienn. Rept. Bd. Agr. and For. Hawaii, pp. 152-159, 1910 (1911).

"Some Observations on the Crysanthemum Plant-Louse (*Macrosiphum solanifolii osborni* Gillette)." Bienn. Rept. Bd. Agr. and For. Hawaii, pp. 160-172, 1910 (1911).

"The Hawaiian Beet Webworm." Bul. 109, pt. I, Bur. Ent. U. S. Dept. Agr., Nov. 6, 1911.

"The Imported Cabbage Webworm." Bul. 109, pt. III, Bur. Ent. U. S. Dept. Agr., April 5, 1912.

While he has been gone from Hawaii for some years he is well remembered here by those with whom he was associated, especially on account of his cheerful disposition and keen interest in his profession.

D. T. Fullaway,
O. H. Swezey,
Committee.

Natural Control of Scale Insects in Hawaii.

BY DAVID T. FULLAWAY.

Mealybugs and scales are amongst our commonest insects, and together with their natural enemies have been the subject of investigation since the beginning of entomological work here. Indeed, the first practical work undertaken was a search for natural enemies of these destructive insects by Albert Koebele, the entomological explorer. Between 1891 and 1908 he made repeated consignments of Coccinellid beetles, parasitic Hymenoptera, etc., to Hawaii, some of which were able to multiply and spread; others failing. A record of this work was preserved in letters, reports, specimens, etc., but it is meagre in detail and faulty through misidentification of either enemy or host. The list of scale insect parasites and their hosts published by the writer in 1912 perpetuates many of the original errors and adds some new ones. Since that date, however, a thorough review of the subject has been made with Mr. P. H. Timberlake, who has a wide knowledge of the parasites and their relationships, and these errors have been corrected or eliminated as far as possible in the list which follows. There can scarcely be any doubt that many of the hymenopterous parasites were introduced here unintentionally with their hosts, before the days of horticultural inspection and quarantine, for there are few records of introductions, and Mr. Koebele states that he made little effort to secure them. On the other hand, the Coccinellid beetles were practically all introduced by Mr. Koebele or others, only four being known here previous to his time.

Scale Insect Parasites in 1912 Rpt. Haw. Exp. Sta. Errata.

p. 26 *Apentelicus* gen. nov.—*Microterys*. *Lepidosaphes* sp., given as the host of (*Apentelicus*) *M. kotinskyi* incorrect.

p. 27 *Odonaspis graminis*, given as the host of *Adelencyrtus odonaspidis*, should be *Odonaspis ruthae*.

Proc. Haw. Entom. Soc., IV, No. 2, June, 1920.

p. 28 l. 12 *Anagyrus* sp.=*Pauridia peregrina*. The host is *Pseudococcus krauhiae*.

13 *Encyrtus fuscus*. *Infelix*, not *fuscus*. Vide Proc. Haw. Ent. Soc. III (5), p. 403.

14 *Encyrtus* sp. with banded antennae=*Anagyrus swezeyi*. *Saissetia* sp., given as the host, incorrect; should be *Trionymus insularis*.

17 *Bleppyrus insularis*. *Mexicanus*, not *insularis*. *Pseudococcus virgatus* the only host. *P. aonidum* incorrectly reported. loc. cit.

19 *Aphycus* sp. Later described as *Aphycus terryi*. Not congeneric with *Aphycus*; transferred to *Pseudococcobius*. The host is *Pseudococcus saccharifolii*; *P. calceolariae* not now credited to the islands.

20 *Aphycus* sp. on *Lepidosaphes* sp. A misidentification of either parasite or host.

26 *Microterys* (*Apentelicus*) *kotinskyi* on *Lepidosaphes* sp., supra.

27 *Adelencyrtus odonaspidis* on *Odonaspis graminis*, supra.

28 *Cerapterocerus* sp. Two species are believed to be included under this name: one is probably *Aniectus annulatus*, reared from *Chemispherica*, the other is supposed to be *Comperiella bifasciata*, reared from certain diaspine scales.

30 *Hemencyrtus* sp.= *Quaylea aliena*, a hyperparasite on *Saissetia nigra* through *Microterys kotinskyi* and *Scutellista cyanea*.

32 *Encyrtus* sp.=*Pauridia peregrina*. Supra.

p. 29 l. 2 *Aneristus ceroplastae* incorrectly determined; should be *Prococcophagus orientalis*, loc. cit., p. 404.

3 *Coccophagus orientalis* now *Prococcophagus orientalis*, supra. *Pseudococcus* sp., given as host, incorrectly reported.

5 *Coccophagus lecanii* on *Aspidiotus rapax*. The parasite is incorrectly determined; is probably a sp. of *Prospaltella*.

7 *Thysanus* sp. incorrectly determined; should be *Signiphora* sp. *Aspidiotus cydoniae* is the host; *Asterolecanium pustulans* incorrectly given.

9 *Aphelinus diaspidis*. Two species of *Aphelinus* are now recognized on scale insects, *A. fuscipennis* and *A. limonus*. What was determined as *A. diaspidis* is probably one or the other of these.

13 *Aphelinus* sp. (wingless) probably incorrectly determined; may be *Perissopterus* sp. *Lepidosaphes* sp., given as the host, a misidentification; should be *Pinnaspis buxi*.

14 *Pteroptrichoides perkinsi* on Coccid n.g. et sp. The host referred to is a diaspine scale on Bombay mango (supposed to be *Lenaspis indica*). The parasite has also been reared from *Morganella longispina*.

15 *Pteroptrichoides* sp. Later described as *Pseudopteroptrix imitatrix*. *Howardia biclavis* is the host; *Asterolecanium pustulans* incorrectly given.

24 records three parasites reared from *Asterolecanium pustulans*. It is believed the host was misidentified with respect to the two first. The last record is correct.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES.

Host	Parasite	Predator
Monophlebinae		
Icerya purchasi		*Novius cardinalis* (1)
Ortheziinae		
Orthezia insignis		*Hyperaspis jocosa* (2)
Dactylopiinae		See fn.
Asterolecanium pustulans	*Tomocera californica** +*Quaylea aliena**	
Antonina indica	*Perissopterus* spp. (2)* *Anagyrus antoninae**	
Eriococcus araucariae	*Aphycomorpha araucariae**	
Trionymus insularis	*Xanthoencyrtus apterus** *Anagyrus swezeyi** *Perissopterus spp.* (2)	*Scymnus ocellatus*°
Pseudococcus bromeliae		*Cryptolaemus montrouzieri* (3)
Pseudococcus krauhiae	*Pauridia peregrina** *Tanaomastix abnormis** (4)	*Scymnus bipunctatus*

* Reared.
° Recorded but not confirmed.
fn. *Scymnus debilis* is a predator on dactylopiine species.
(1) Introduced 1890 from California.
(2) Introduced 1908 from Mexico.
(3) Introduced about 1894 from Australia.
(4) Introduced 1915 from California.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Pseudococcus filamentosus		*Scymnus bipunctatus* (5)
		Gitonides perspicax
		Cryptolaemus montrouzieri
Pseudococcus nipae		*Cryptolaemus montrouzieri*
		Rhizobius ventralis
Pseudococcus sacchari	*Tanaomastix abnormis* (6)	*Cryptolaemus montrouzieri*
		Aspergillus parasiticus
		Entomophthora pseudococci
Pseudococcus sacharifolii	*Xanthocnemyrtus fullawayi**	
	*Pseudococcobius terryi**	
Pseudococcus straussiae	*Anagyrus* sp.*	
Pseudococcus virgatus	*Blepyrus mexicanus**	*Cryptolaemus montrouzieri*
	*Tanaomastix abnormis**	*Scymnus bipunctatus*
Coccinae		See fn.
Pulvinaria mammae	*Microterys kotinskyi*	*Cryptolaemus montrouzieri*
Pulvinaria psidii	*Microterys kotinskyi**	*Cryptolaemus montrouzieri*
Pulvinaria urbicola	*Prococcophagus orientalis*	

Reared.

Recorded but not confirmed.

fn. *Olla abdominalis* and *Azya lutipes* (introduced 1908 from Mexico) are predators on lecaniine species. Several fungus diseases of lecaniine scales were introduced in 1894; *vide* Koebele 1897 Rpt.

(5) Introduced 1895 from Japan. Reintroduced 1906 from S. China. Reintroduced 1914 from Philippine Islands.

(6) Reared by Swezey under artificial conditions.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Ceroplastes rubens	*Microterys kotinskyi**	
	Tomocera californica°	
	Tomocera ceroplastis (7)	
	Prococcophagus orientalis°	
Eucalymnatus tessalatus	*Aniecetus annulatus**	
Coccus longulus	*Microterys kotinskyi**	
	*Aphycus alberti**	
	*Prococcophagus orientalis**	
Coccus viridis	*Microterys kotinskyi**	
	+*Quaylea aliena**	
	Coccophagus lecanii	
	Coccophagus ochraceus	
	Prococcophagus orientalis	
Saissetia hemispherica	*Scutellista cyanea** (9)	
	+*Quaylea aliena**	
	*Encyrtus infelix** (10)	
	*Encyrtus barbatus**	
	Aniecetus annulatus° (11)	

* Reared.
° Recorded but not confirmed.
(7) Recorded by Perkins 1906 but not collected since.
(9) Introduced 1905 from California.
(10) Reintroduced 1915 from California.
(11) *Cerapterocerus* sp. recorded, is believed to be identical with *Aniecetus*.

Host	Parasite	Predator
Saissetia nigra	*Encyrtus infelix**	
	*Encyrtus barbatus**	
	*Scutellista cyanea**	
	†*Quaylea aliena**	
	*Prococcophagus orientalis**	
	*Microterys kotinskyi**	
	Tomocera californica	
Saissetia oleae	*Scutellista cyanea*	
	† *Quaylea aliena*	
	Tomocera californica?	
Diaspinae	See fn.	
Howardia biclavis	*Pseudopteroptrix imitatrix**	
	Aphelinus fuscipennis?	
Diaspis bromeliae	*Aphelinus diaspidis*	
	Aphelinus limonus (12)	
	Aspidiotiphagus citrinus (12)	

* Reared.

† Recorded but not confirmed.

(12) Recorded by Kotinsky with slide mount of parasite

fn. *Sticholotis punctatus* (introduced from China and Japan 1895), *Pentilia nigra* (introduced from Japan 1895), *Cycleme nigellum* (introduced about 1894 from Australia) and *Chilocorus circumdatus* (introduced 1895 from S. China) are predators on diaspine scales. *Sphaerostilbe coccophila*, a fungus disease of diaspine scales, introduced from Florida 1899-1900

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Diaspis echinocacti	*Aphelinus fuscipennis* (13)	
	Aspidiotiphagus citrinus (14)	
Aulacaspis rosae	*Aphelinus diaspidis*°	
	Aspidiotiphagus citrinus (12)	
Phenacaspis eugeniae	*Aspidiotiphagus citrinus*	*Lindorus lopanthae*
Hemichionaspis minor	*Aphelinus limonus*	
(*rhododendri*)	*Aphelinus fuscipennis* (12)	
	Aspidiotiphagus citrinus	
Pinnaspis buxi	*Aphelinus* (wingless) (15)	
Aspidiotus cyanophylli	*Aphelinus limonus*	
	Aspidiotiphagus citrinus	
	Signiphora sp. (14)	
Aspidiotus cydoniae	*Signiphora* sp.	
	Aphelinus limonus (12)	
	Aphelinus fuscipennis (14)	

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* Reared.
° Recorded but not confirmed.
(12) Recorded by Kotinsky with slide mount of parasite.
(13) Reared by Ehrhorn and Fullaway. Recorded by latter as *diaspidis*.
(14) Recorded by Ehrhorn with slide mount of parasite.
(15) This may be a species of *Perissopterus*. *Perissopterus chinensis* introduced 1906 from S. China

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Aspidiotus rapax	*Prospaltella* sp.	
	Perissopterus sp. (12)	
	Pseudopteroptrix imitatrix (12)	
(sp.)	*Comperiella bifasciata* (12) (16)	
	Aphelinus sp. (12)	
Aspidiotus sp. on *Bombax ceiba*	*Comperiella bifasciata* (12) (16)	
Leucaspis indica	*Pteroptrichoides perkinsi* (12)	
Morganella longispina	*Pteroptrichoides perkinsi**	
	Prospaltella koebelei (17)	
Chrysomphalus aonidum	*Aspidiotiphagus citrinus**	
	Aphelinus fuscipennis?	
Chrysomphalus rossi	*Aphelinus limonus**	
Odonaspis ruthae	*Adelencyrtus odonaspidis**	
Lepidosaphes auriculata	*Aphelinus limonus* (12)	
(*crotonis*)	*Aspidiotiphagus citrinus* (12)	
Lepidosaphes beckii	*Aphelinus limonus*	*Lindorus lopanthae*
	Aspidiotiphagus citrinus	

* Reared.
? Recorded but not confirmed.
(12) Recorded by Kotinsky with slide mount of parasite
(16) Introduced 1908 from Japan.
(17) Reared by Koebele.

LIST OF SCALE INSECTS AND THEIR NATURAL ENEMIES—Cont'd.

Host	Parasite	Predator
Parlatoria ziziphus	*Aspidiotiphagus citrinus**	*Orcus chalybeus* (18)
Pseudoparlatoria giffardi	*Aspidiotiphagus citrinus* (12)	
	Aphelinus limonus (12)	

* Reared.
(12) Recorded by Kotinsky with slide mount of parasite.
(18) Introduced 1894 from Australia.

NOTES AND EXHIBITIONS.

Scyphophorus sp.—Mr. Muir exhibited a large black weevil captured December 17th, 1918, while crawling on a basement window of the Sugar Planters' Experiment Station. It was found to be a species near to *S. acupunctatus*, of which there are specimens in the Harford & Baron collection of American Coleoptera owned by Mr. W. M. Giffard. In regard to the habits of the weevils of this genus, one is known to live at the base of the yucca plant and another is injurious to sisal in Yucatan. It is the first record of the finding of anything of the kind here, and quite unexplainable how this single specimen could have made its arrival here.

Trionymus insularis and *Odonaspis ruthae*.—Mr. Ehrhorn recorded the finding of these two scales on *Eragrostis* from Koko Head, handed him by Mr. W. M. Giffard, December 16, 1918. He mentioned *Pseudococcus eragrostidis* as a third species known to occur on this grass.

Rhynchophorous larvae.—Mr. Ehrhorn exhibited a vial containing 122 larvae of a rhynchophorous beetle, found in quarantine inspection work in soil at the base of a Thuya plant from Japan.

Sinoxylon conigerum.—Mr. Swezey exhibited pieces of branches of the algaroba tree showing the work of the adults of this beetle. The specimens of wood were taken from a fallen tree that had been down about three weeks. In each instance a beetle had burrowed into the branch and cut away so much that it nearly severed the branch, very much as does the well-known tree-primer in oak and hickory trees of America, so that they broke off very readily. The branches were one inch to an inch and a half in diameter.

Nesolocus giffardi.—Mr. Swezey exhibited pieces of branches of the *Cheirodendron* tree showing the characteristic pupal cells of this large weevil. They were collected in the forest on the ridge at Kulionou, Dec. 22nd. No beetles were

found, nor larvae, but the presence of the pupal cells in the wood is taken as sufficient indication of the existence of the weevil in the forest at the extreme southeastern end of the Koolau Range. The beetle has hitherto been known only on Mt. Tantalus, Kaumuahona, Lanihuli and Palolo Valley. No doubt it will eventually be found to occur thruout the forests of this Island wherever its host plant occurs.

Mr. Crawford spoke at some length on three projects for universities of tropical agriculture.

FEBRUARY 6th, 1919.

The 161st meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Langford, Muir, Pemberton, Swezey, Timberlake and Williams.

Minutes of previous meeting read and approved.

NOTES AND EXHIBITIONS.

Halictidae.—Mr. Bridwell read the translation of a portion of de Walckenaers Memoires pour Servis à l'Histoire Naturelle des Abeilles solitaires, que composent le genre Halicte, published in 1817, on the habits of this family of bees.

Psychodid.—Mr. Bridwell reported finding a Psychodid fly very common now at Waikiki. It is black, and quite different from the Psychodid fly usually taken at light.

Apion sp.—Mr. Muir exhibited a specimen of this Curculionid found crawling up a slat on a fern house in Manoa Valley, January 26th, 1919. The species is near to but distinct from *Apion pennsylvanica*, judging from the description of that species. It is the first record of the finding of an *Apion* in Honolulu.

Psyllidae.—Mr. Crawford reported that the examination of a small collection of Hawaiian Psyllids referred to him by

Mr. Giffard, disclosed one new species of *Trioza* collected by Mr. Giffard at Kilauea, June 18, 1918, which he has described, also 34 additional specimens of *Trioza ohiacola* from Kilauea, 11 specimens of *Trioza hawaiiensis* and 3 specimens of *Kuwayama nigricapila*.

Cryptotermes sp.—Mr. Fullaway exhibited a small colony of this termite which contained a laying queen.

Vespid wasp nest.—Mr. Ehrhorn exhibited the nest of a Vespid wasp attached to an orchid leaf. It was found on a steamer from a South American port. The nest comprised six cells, built one on another, and all empty save one.

MARCH 6th, 1919.

The 162nd meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Ehrhorn, Fullaway, Grinnell, Muir, Pemberton, Rosa, Swezey, Timberlake and Willard.

Minutes of previous meeting were read and approved.

The Committee on Revision of the By-laws reported, and the revision of by-laws which they offered was adopted as a whole, after being discussed article by article. By a provision of the old by-laws, it is subject to ratification at the following meeting.

The committee on the suppression of the ginger weevil reported that specimens had been sent to Washington for determination, and that Mr. Schwarz had expressed the opinion that they might be a variety of *Acalles lateralis*, or possibly a foreign *Acalles*.

PAPER.

Notes on Nesotocus Giffardi Perkins (Coleoptera).

BY JOHN COLBURN BRIDWELL.

The genus *Nesotocus* Perkins is one of the most isolated types of beetles present in the Islands. While placed in the Cossonidae by Dr. Perkins and associated with certain Central American weevils by Champion, it is clear that they have no close affinity with any of the Hawaiian Cossonidae and are perhaps to be considered as entirely isolated and not presenting certain affinities anywhere.

Dr. Perkins found the beetles of this genus associated with the Araliaceous tree *Cheirodendron* wherever they had been found and doubtfully reported them as attacking another similar tree.

The genus is composed of four closely allied species inhabiting Hawaii, Maui, Oahu and Kauai. The Oahu species *N. giffardi* has always been considered one of the rarer endemic insects, having only once been seen in numbers when Dr. C. M. Cooke, Jr., found numerous adults on Maunmahona peak in the Koolau Mts. in the early morning of May 1, 1914, running about actively over the trunk of a fallen tree. In my collecting in the Hawaiian Islands since 1913, it has been taken but once and then only a single specimen which, as it happens, was found upon the large-leaved *Saltonia* with *Proterhinus manrus*. At the head of Palolo Valley, trees have been seen repeatedly with dead branches, the trunk bored by the larvae but not until November 17, 1918, were we able to locate the beetle at work. Upon that date Dr Williams, Mr. Swezey and the writer were collecting upon the Castle Trail upon Kaunmahona when we found a tree of *Cheirodendron Gaudichaudii* which had fallen in a land slide and was heavily infested by the larvae of this weevil. This was in one of the little hanging valleys or coves where numbers of these trees—rather an unusual species in this part

Proc. Haw. Entom. Soc., IV, No. 2, June, 1920.

of the mountains—were growing. This tree had fallen some time since and the eggs had evidently been laid soon after it had fallen. The tree, including the roots which were exposed, was about thirty feet in length with a diameter at the base of about nine inches. A rough estimate of the numbers of the larvae present indicated not less than three or four hundred larvae at work. These were in all stages from those very recently hatched to full grown ones and a few had already pupated.

The larvae during their feeding period work in the cambium layer of the bark and in some instances complete their transformations there, making their pupal cells between the bark and the wood. Ordinarily however upon reaching full growth they penetrate into the wood for ten or fifteen millimeters, nearly vertically and then direct the burrow along the grain of the wood and make a larval chamber there 20-35 millimeters long. When it is completed the larva plugs up the entrance with shredded wood and transforms with its head directed toward the opening and its beak folded against its breast. When it emerges the shredded wood is dragged back behind the weevil into its chamber.

A number of the full-fed larvae and the few pupae found were brought down in an effort to breed them out but with very indifferent success. Mr. Swezey found the larvae would construct pupal chambers in sugar-cane but in the warmer temperature of the lowlands they proved susceptible to molds and no satisfactory adults were secured. Long after the last of the pupae had made ineffectual efforts to transform and the larvae had molded or died in transformation, Mr. Swezey and I were able, on January 12, 1919, to return to this tree. To our surprise only a few of the grubs had reached maturity and none or but very few had emerged, while most of the larvae had become pupae. A considerable number of these were brought down and placed in a jar in damp moss and most of these transformed satisfactorily.

When these emerged it was not convenient to secure their natural food, so green branches of the cultivated *Nothopanax Guilfoylei* were placed in the jars with the living weevils. Some of these branches died and the bark in the damp moss became soft rotten like that in which the larvae had been originally found. Upon this the adults fed readily and also upon the tender soft green living bark of the growing tips. The adults were kept alive in this way for a month or more but no oviposition was observed.

Subsequently on the day the colony was found, the author found unmistakable pupal chambers of this species in the small dead branches of *Tetraplasandra oahuensis*, and on January 12, after securing our material from the original tree we continued along the Castle Trail coming down from Mount Olympus into Manoa Valley, studying the various Araliaceous trees encountered along the way. We were in this way able to make certain that this insect attacks the living trees of *Cheirodendron platyphyllum*, *C. Gaudichaudii*, *Pterotropia*, *Tetraplasandra oahuensis*, and *T. meiandra*—all the Araliaceous trees encountered.

The larvae were found in small branches dead at the tip and dying below, the young larvae living in apparently uninjured bark at the edge of the dying portion. Frequently in these smaller branches the larva, in making its pupal chamber, penetrates into the large pith cavities and transforms there.

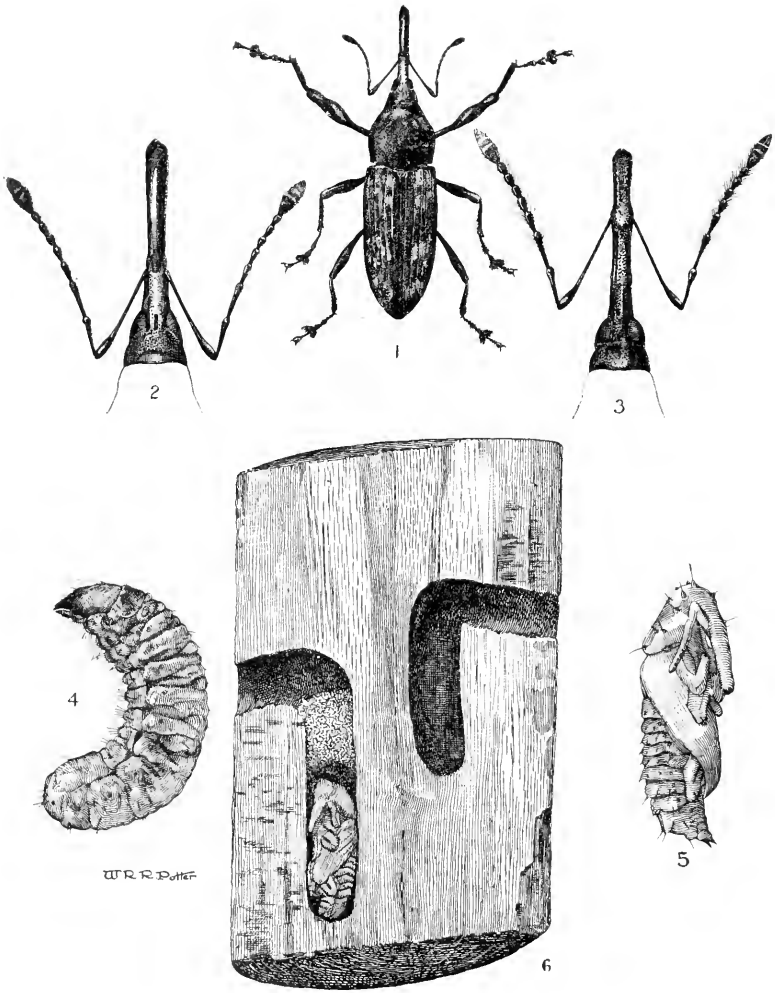
At various times the work of this weevil has been observed from Kulionou at the extreme southeastern limits of its food plants in the Koolau mountains and as far northwest as Lanihuli, the peak on the northwest side of the Nuuanu Valley. Probably, since the weevil is a strong flyer, it extends over this island wherever its food plants are found. We have never found its work on the lowland *Reynoldsia*, all traces of its work having been found at elevations of about twelve hundred feet and above. There seems but little doubt

that this insect is occasionally instrumental in destroying its host tree. The habit of the adult in feeding both in decaying and sound bark would probably serve at times to inoculate the living tree with decay producing organisms. However, there seems to be no indication that it is producing any considerable injury, since the trees attacked are among the most vigorous species of trees in the native forests.

It is quite evident that the insect is not uncommon but on account of the scattered trees which it attacks it is only abundant in any one place when a fallen tree or dying tree permits the development in numbers; ordinarily it attacks only a branch here and a branch there, but our observation indicates that several of these branches might be found at almost any time if carefully searched for.

Plate VI shows views of portions of the trunk of a tree observed by Mr. Swezey along the Manoa Cliffs Trail on Tantalus. It was a standing trunk of a large *Cheirodendron Gaudichaudii* tree, from which the bark had fallen, exposing thousands of the openings of the pupal cells of this weevil. Evidence was not at hand to determine whether the weevil larvae had been the cause of the death of the tree, or whether their work was performed after the tree was dying from other causes.

The upper surface of the rostrum in the male is provided with tuberculate spines irregularly disposed behind the antennae and in an irregularly spaced series on either side in front; the rostrum is widened a little at the apex in the male but not in the female; in the male the antennae are inserted more than half way from the eyes to the tip of the beak, they are greatly elongate, the scape and flagellum each as long as the greatly elongate beak, and the joints of the funicle are provided with long loose hairs four or five times as long as the width of the joints; in the female the antennae are shorter, inserted about one-third the distance from the eyes to the apex and none of the hairs are longer than the width of a joint. The last tergite of the female is pectinate along its



Cheirodendron weevil—*Nesotocus giffardi.*

Fig. 1, Adult beetle. Fig. 2, Head and antennae of female. Fig. 3, Head and Antennae of male. Fig. 4. Larvae. Fig 5, Pupa. Fig. 6, Section thru branch of *Cheirodendron* tree showing pupal cells and one pupa in situ.

Photos of portions of the trunk of a dead *Chenopodium* tree. The numerous round holes are the openings of pupal cells.

rounded posterior margin with about fifteen narrow teeth, while it is simple in the male. The legs, particularly the anterior pair, are more elongate in the male and the hind femora beneath toward the base have stout scale-like lance-linear hairs and the posterior tibiae beneath are serrulate and spinulose.

NOTES AND EXHIBITIONS.

Sarcophaga fuscicauda.—Mr. Timberlake stated that Dr. R. R. Parker had determined for him our unnamed species of *Sarcophaga* as *S. fuscicauda* Böttcher, described in Ent. Mitt. I (6) 1912, p. 168, fig. 5, from Formosa. It is not known how many years the species has been in Hawaii. The earliest specimen taken was by F. W. Terry in 1905.

Exochus femoralis.—Mr. Timberlake exhibited a specimen of this Ichneumonid captured on the window in the laboratory of the Experiment Station, H. S. P. A. Apparently this is as yet a rare immigrant, as only an occasional specimen has been taken.

Japyx sharpi.—Mr. Muir exhibited a live specimen of this rare Thysanuran, found in examining some soil from Kauai.

Heteheva giffardi.—Mr. Swezey reported having collected large numbers of this Psyllid on *Platydesma campanulata* at Glenwood, Hawaii. There were no galls present on the leaves, nor could any young stages be found, so the habits of the young of this species could not be ascertained.

Megatrioza palmicola.—Mr. Swezey exhibited adults and young of the palm Psyllid collected on a native *Pritchardia* near Glenwood, Hawaii. The young live externally on the leaves, not in galls, and produce a large quantity of woolly wax.

Gracilaria hibiscella.—Mr. Swezey exhibited leaves of Hibiscus taken from hedges in Hilo, Hawaii, that were very much mined by this little Tineid. In many of the hedges there the infestation was so severe that the leaves were falling and leaving the hedge nearly bare. Many of the mines were found to contain parasites. Some were bred out.

Vanessa tammeamea.—Mr. Swezey reported having observed the Kamehameha butterfly in the yard of the Hilo Hotel. Some small *Pipturus* trees were found there, and on the leaves were small caterpillars of the butterfly. This is probably the nearest to sea level that it has been found breeding.

APRIL 3rd, 1919.

The 163rd meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Crawford, Ehrhorn, Fullaway, Grinnell, Langford, Muir, Pemberton, Rosa, Swezey and Timberlake.

Minutes of previous meeting were read and approved.

The Revised By-laws as presented and discussed at the previous meeting were formally adopted.

Under a provision of the new By-laws, Messrs. F. Muir and E. M. Ehrhorn were elected to the Executive Committee.

Revised By-laws of the Hawaiian Entomological Society as Adopted April 3rd, 1919.

Article 1. Name.

The name of this organization shall be The Hawaiian Entomological Society.

Article 2. Object.

The object of the Society shall be to promote the study of Entomology in all possible bearings, and to encourage friendly relations between those in any way interested in the science.

Article 3. Members.

The Society shall consist of *Active*, *Corresponding* and *Honorary* members. No *Corresponding* members shall be elected from residents on the Island of Oahu.

Election of members shall be by ballot, nomination having been made by a member of the Society at a previous meeting.

A majority vote of active members present shall be necessary for election.

The annual dues for Active Members shall be five dollars and for Corresponding Members two dollars; Active Members absent from the Territory for twelve consecutive months or more to be considered as Corresponding Members. Honorary Members shall be exempt from dues.

Any member in arrears for one year may, after due notification be dropped from the rolls. No member in arrears shall be entitled to a vote or to the Proceedings of the Society for that year.

Article 4. Officers.

The officers of the Society shall be a President, a Vice-President and a Secretary-Treasurer to be elected by ballot at the annual meeting. These officers, together with two active members to be elected by the Society in the same manner as the Officers, to form an Executive Committee.

Article 5. Duties of Officers.

(a) The duty of the President shall be to preside at the meetings of the Society and Committees, and regulate all the discussions and proceedings therein, and to execute or see to the execution of the By-Laws. In case of an equality of Vote the President shall have a double or casting Vote.

It shall be the duty of the President to deliver an address at the closing meeting of the year.

(b) In the absence of the President the Vice-President shall fill his place, and shall for the time being have all the authority, power and privilege of President.

(c) In the absence of the President and Vice-President a chairman pro tem may be elected by a majority Vote of the Active Members present.

(d) The Secretary-Treasurer shall conduct all the correspondence of the Society, keep a list of members, give due notices of all meetings and take and preserve correct minutes

of the Proceedings of the Society; he shall have charge of all moneys of the Society, collect all dues, assessments, receipts and contributions, make disbursements under the direction of the Executive Committee, and submit a report of the state of finances of the Society at the annual meeting or whenever called for.

(c) The Executive Committee shall appoint one or more active members from among themselves or otherwise to take care of the Library and Collections and to edit the Proceedings.

The Librarian and Curator shall have custody of the Library and Collections, and shall manage them under the direction of the Executive Committee.

The Editor's duties shall be those usually pertaining to the office.

Article 6. Meetings.

The regular meetings shall be held, unless otherwise ordered by the Executive Committee, on the first Thursday of each month. The annual meeting for the election of officers shall be the regular meeting for the month of December. Special meetings may be called by the Executive Committee, or by the President at the written request of five Active Members. Five members shall constitute a quorum for the transaction of business.

Article 7. Amendment.

These By-Laws may be amended at any regular meeting by a two-thirds vote of the active members present, a copy of each amendment proposed having been presented at the preceding regular meeting.

Article 8. Order of Business.

(a) Reading and approval of minutes.
(b) Reports of officers and committees.
(c) Nomination and election of members.
(d) Nomination and election of officers at annual meetings.

(e) Unfinished and new business.
(f) Presidential address at annual meeting.
(g) Reading of papers on local subjects.
(h) Reading of papers on foreign subjects.
(i) Exhibitions and discussions of local material.
(j) Exhibition and discussion of foreign material.

PAPERS.

A New Species of Fruitfly Parasite from Java (Hymenoptera).

BY D. T. FULLAWAY.

Biosteres javanus n. sp.

♀ 4 mm. long; head and thorax ochraceous; closely punctate, rather coarsely on the head, and clothed with silvery hairs; abdomen yellowish brown, impunctate; legs, mandibles and palpi luteous; antennae fuscous brown, vertex of the head and valves of the ovipositor fuscous. Head transverse, more than twice as wide as long, wide between the eyes, which are convex; ocelli arranged in an equilateral triangle on the vertex, the field being elevated and smooth with a circumferential groove, posterior ocelli almost vertical, ocelli to the eye nearly twice the distance from ocellus to ocellus; antennae fairly close together, further removed from the eye than from each other, the sockets deep with elevated rims, 40-segmented, the scape and pedicel stout, the flagellum filamentous; face convex, subcarinate, wider than long, receding below, clypeal fossae deep; cheeks fairly wide, mandibles stout, curved and apically toothed. Thorax robust, nearly as wide as the head and deeper than wide, mesothoracic scutum with parapsidal grooves very deep, converging and provided with large fossae; two slight submedian depressions anteriorly; prescutellar sulcus with 4 deep fossae; scutellum triangular; metanotum carinate in the middle and fossulate at the sides with an anterior and posterior smooth transverse band; propodeum irregularly areolate and somewhat rugose, stigmata small and round. Mesopleurae with a deep and fossulated sulcus. Abdomen ovate, somewhat compressed apically, 1st and 2nd tergites longitudinally striate and separated by a deep sulcus, 1st tergite longitudinally bicarinate, the sides also strongly margined; following tergites smooth and shining with a transverse line of fine silvery hairs close to the posterior border; ovipositor exserted and longer than the abdomen. Legs rather slender. Wings hyaline, veins fuscous, radius in anterior wing arising at about the middle of the stigma, which is lanceolate, second abscissa somewhat shorter than the 1st transverse cubitus.

♂ 3.5 mm. long, black, the face, orbits of the eye and antennae basally reddish brown to testaceous, legs, mandibles, palpi and sternites of the abdomen (extending on to the tergite of the 2nd segment laterally and the posterior margin of the following segments) luteous.

Described from 19 females and 7 males (type, allotype and paratypes), reared at Buitenzorg, Java, from pupae of *Dacus ferrugineus* in fruits of *Capsicum*, by P. van der Goot, 10.8.18. Types in collection H. S. P. A. Exp. Sta., Honolulu.

A New Species of Immigrant Termite from the Hawaiian Islands.

BY MASAMITSU OSHIMA,
Of the Institute of Science, Government of Formosa.

In the following is given the record of an immigrant termite, which first appeared in Honolulu in 1913 and has succeeded in becoming firmly established there. Specimens were forwarded to me by Mr. D. T. Fullaway, Entomologist of the Hawaiian Board of Agriculture and Forestry. According to his information, it is doing considerable damage in the city of Honolulu, completely honeycombing wood-products and woodwork. It does not build mounds like many tropical species, but makes its nest in or near the ground, using a considerable amount of soil; it forms very large colonies; it builds covered passage-ways when it comes to the surface.

No doubt these are characteristic of the termites grouped in the genus *Coptotermes*, most formidable pests in wooden structures. After examining the specimens, I came to the conclusion that the present species is new to science, related very closely, however, to *Coptotermes formosanus* Shiraki, from Japan and Formosa. Up to the present, there is no record with regard to the occurrence of *Coptotermes* in the Hawaiian Islands. Therefore, it is reasonable to believe that it has been introduced from South America or the Orient, as suggested by Mr. Fullaway.

Here I express my hearty thanks to Mr. Fullaway, by whose courtesy I was able to examine these interesting specimens.

Coptotermes intrudens n. sp.

Imago:—Body reddish brown, head somewhat darker; clypeus, antennae, legs and ventral surface of abdomen yellowish brown; wings hyaline, with yellowish costal margin. Head sparingly provided with minute hairs; thoracic plates almost smooth, with a small number of hairs; wing-stumps hairy; abdominal tergites densely covered with delicate hairs.

Head round, fontanelle indistinct; post-clypeus very short, its anterior border wavy; ante-clypeus exceedingly longer than the former, obtusely pointed anteriorly; eyes prominent; ocelli oval, the distance to eye is less than half its longer diameter; labrum tongue-shaped, entirely covering the mandibles; antennae 15-jointed (broken), basal joint cylindrical, 2nd squarish, slightly longer than 3rd, 4th joint shorter than 3rd; pronotum subreniform, the middle of the posterior border more strongly indented than that of the anterior; mesonotum and metanotum slightly narrower than pronotum, their posterior borders weakly emarginate at middle; anterior wing-stumps much larger than the posterior, covering the base of the latter; median nerve of the anterior wing runs nearer to cubitus than radius, furcating at the tip; cubitus with ca. 8 branches, of which the proximal ones stronger; cubitus of the posterior wing with ca. 6 branches.

Length of body	7.00 mm.
Length of head	1.31 mm.
Width of head	1.38 mm.
Width of pronotum	1.40 mm.
Length of pronotum	0.91 mm.
Length of anterior wing	11.00 mm.

Soldier:—Head yellow; mandibles dark brown; antennae and labial palpi yellowish; abdomen straw-colored. Head and pronotum sparingly pilose; mesonotum, metanotum and abdominal tergites densely provided with hairs.

Head suborbicular, fontanelle distinct, its orifice directed forward; ante-clypeus short, trapezoidal, post-clypeus not separated from forehead; labrum lancet-shaped, the tip hyaline and sharply pointed, scarcely reaching the middle of the mandible; mandible sabre-shaped, with strongly incurved, piercing tip, the cutting margin smooth; antennae 15-17 jointed, basal joint cylindrical, 2nd joint quadrate, longer than 3rd, 3rd joint smallest, slightly shorter than 4th; gula gradually widening anteriorly and converging at the tip; pronotum narrower than head, anterior and posterior borders distinctly bilobed, sides slightly converging posteriorly; mesonotum and metanotum nearly as broad as pronotum.

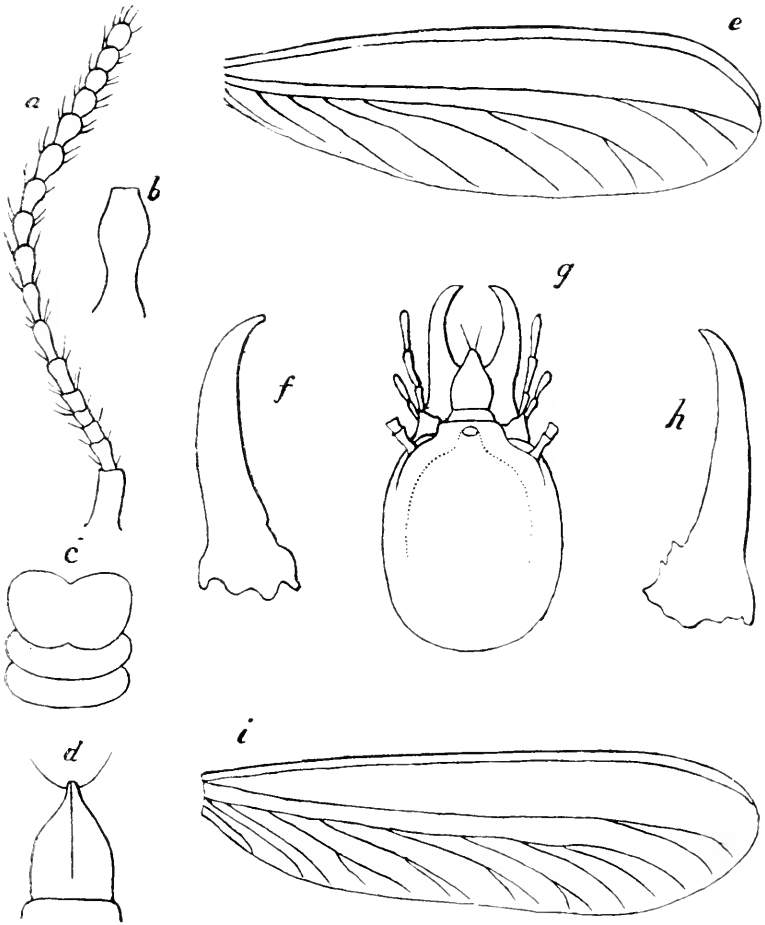


PLATE VII: *Coptotermes intrudens.*

a. Antennae of the soldier. *b.* gula of the soldier. *c.* Thorax of the soldier. *d.* Labrum of the soldier. *e.* Anterior wing of the imago. *f.* Left mandible of the soldier. *g.* Head of the soldier. *h.* Right mandible of the soldier. *i.* Posterior wing of the imago.

Length of body ---------- 5.00-5.50 mm.
Length of head with mandibles ---------- 2.50-2.63 mm.
Length of head without mandibles ---------- 1.63 mm.
Width of head ---------- 1.25-1.31 mm.
Width of pronotum ---------- 0.90-0.97 mm.
Length of pronotum ---------- 0.56-0.63 mm.

Worker: Head yellow; abdomen whitish. Head sparingly pilose; abdominal tergites densely covered with hairs.

Antennae 15-jointed, basal joint cylindrical, 2nd nearly as long as 3rd and 4th taken together; pronotum subreniform, its anterior and posterior borders indented at middle, narrower than mesonotum; metanotum broader than mesonotum.

Length of head ---------- 1.00 mm.
Width of head ---------- 1.28 mm.
Width of pronotum ---------- 0.81 mm.

Hab.: Honolulu, Oahu, Hawaiian Islands.

Remarks: The nearest relative of the present species seems to be *Coptotermes formosanus* Shiraki, from the Island of Formosa, which causes most serious damage to wooden structures. It differs, however, from the latter in having the following characters: Imago is provided with larger pronotum; head of the soldier does not converge anteriorly, measuring 1.25-1.31mm. × 1.63mm., instead of 1.18mm. × 1.56mm.

Notes on Callithmysus microgaster (Sharp). (Coleoptera, Plagithmysides).

BY O. H. SWEZEY.

This beetle was first collected by Blackburn (3 specimens), and described as a *Clytarlus* by Sharp in Tr. Ent. Soc. London, p. 103, 1879. It is next mentioned in Tr. Dublin Soc. (2), III, p. 261, 1885. "Rare, in decaying wood on the mountains near Honolulu, at an elevation of 2000 feet. June". (Blackburn). It is figured in the same publication. (Pl. V, fig. 46).

In Fauna Hawaiiensis, II, p. 113, 1900, Sharp places it in the genus *Callithmysus*, and adds var. *hirtipes*(?) based on "One individual on the ridge leading from the head of Panoa

Valley to the peak called Konahuanui, Oct. 31, 1892. On *Bobea* sp." (Perkins).

Sharp again mentions the species in Fauna Hawaiiensis, III, p. 649, 1910. "Oahu, N. W. Koolau Range, April, 1901, two specimens (Perkins). Only six individuals are known of *Callithmysus microgaster*. They come, I believe, from three different spots on Oahu, and seem to indicate the probable existence of local races."

Perkins in his paper on "The Insects of Tantalus", Proc. Haw. Ent. Soc., I, p. 15, 1906, states that *C. microgaster* occurs on *Bobea*. He says, "I have taken *microgaster* in May, June and November. The larvae I have taken in numbers but the beetles rarely and singly".

At the September 1913 meeting of the Hawaiian Entomological Society, Mr. Giffard exhibited a specimen of *C. microgaster* which had been given him by Mr. Koebele. (Proc. Haw. Ent. Soc., III, p. 14, 1914).

Recently, I have had the good fortune to rear a specimen of this beautiful beetle. In a fallen tree of *Perrottetia sandwicensis* blocking the Cooke Trail a little below the Panoa Flats, on January 12, 1919, I found several Cerambycid larvae. I cut out a section of the tree about ten inches long and three inches in diameter, containing a larva which seemed to be nearly full-grown. I placed this in a glass jar in the laboratory at the Experiment Station, and had an occasional look to see how the larva was getting on. It continued eating and migrating round in the outer layer of wood just beneath the bark. On February 19, it was found to have burrowed deeper into the wood; and on March 25, a fine adult beetle was found moving about in the jar. From Dr. Sharp's characterization of the variety, this would be var. *hirtipes*. This is not far from where Dr. Perkins collected his specimen of *hirtipes* on *Bobea*.

NOTES AND EXHIBITIONS.

Cremastus hymeniae.—Mr. Swezey recorded this parasite from Hawaii for the first time. He reared it from the banana

leaf-roller (*Omiodes meyricki*) taken at Mountain View.

Amblyteles koebelei.—Mr. Bridwell exhibited specimens of this Ichneumonid and stated that from material collected on Maui, he could distinguish a second species. Unfortunately, only males have been collected up to the present. It is a dark-winged form without black bands on the abdomen. The form described by Swezey as *Ichneumon koebelei* is also dark-winged, but only in the opposite sex, its male being a very light form with light wings. Mr. Timberlake stated that the form is congeneric with *Amblyteles* species, and not so with forms now called *Ichneumon*.

*Mimulapis versatilis.**—Mr. Bridwell exhibited the type series of this bee and also some other bees with very diverse characters, all of which had at some time or other been included in the genus *Prosopis*.

New Anthomyid.—Mr. Timberlake exhibited an Anthomyid fly captured recently in Honolulu on Lunalilo St. near Victoria. It is an immigrant not previously collected. It is light gray and has a transverse black band across the thorax.

MAY 1st, 1919.

The 164th meeting of the Society was held in the usual place, with Vice-President Crawford in the chair. Other members present: Messrs. Bridwell, Fullaway, Muir, Pemberton, Rosa, Swezey, Timberlake and Willard.

Minutes of previous meeting were read and approved.

PAPERS.

Notes on the Immigrant Hawaiian Species of Ichneumonini or Pimplini of Authors (Hymenoptera).

BY P. H. TIMBERLAKE.

As there seems to be some misunderstanding concerning the identity of the *Pimpla hawaiiensis* of Cameron, the writer

*Proc. Haw. Ent. Soc., IV, No. 1, p. 163, 1919.

*Proc. Haw. Ent. Soc., IV, No. 2, June, 1920.

has thought it wise to redescribe the species with a review of the host records. In accordance with a recent paper by Cushman and Rohwer* the species must be placed in the genus *Ephialtes* Schrank. A species that is best referred to *Itoplectis* is also brought forward as new.

Ephialtes hawaiiensis (Cameron).

Pimpla hawaiiensis Cameron, Mem. Manchester Lit. & Phil. Soc., 10 (3rd Ser.), 1886, p. 239, ♂.

Pimpla hawaiiensis Ashmead, Fauna Hawaiiensis, 1, pt. 3, 1901, p. 339, ♀, ♂.

Pimpla hawaiiensis Swezey, Ent. Bull., 5, Exper. Stat., H. S. P. A., 1907, p. 42, pl. 5, fig. 5, ♀, ♂.

Pimpla turionellae Morley, Rev. Ichn., 3, 1914, p. 60, 66, (in part).

There seems to be considerable confusion in regard to this species probably arising from the fact that Ashmead failed to describe the female correctly. That the hind legs are entirely red in the female was not brought out, Ashmead merely adding to Cameron's description of the male, which was copied verbatim with one slight omission, the length, and the statement that the ovipositor is less than one-half the abdomen. This may account for Perkins believing that there is a second "commonplace *Pimpla*" in the Islands†, a record which I cannot accept as all the local collections show but this one species and the new *Itoplectis* described below. Morley has synonymized *hawaiiensis* with *Ephialtes turionellae* (Linné) after examining Cameron's type male. While there seems to be no reason to dispute Morley's decision that the male of this species is quite typical of *turionellae*, this in itself even if entirely true is not sufficient grounds for synonymizing the species, since two species as in the present case may be quite or nearly identical in one sex and as clearly distinct in the other.

Hawaiiensis is probably an immigrant from some part of America and Perkins considered that he had seen the same

* Proc. Entom. Soc. Washington, 20, Apr., 1919, pp. 186-188.
† Fauna Hawaiiensis, 2, pt. 6, 1910, p. 676.

species from Mexico. In the entirely red legs of the female and oval propodeal spiracles it is close to *Ephialtes punicipes* (Cresson) recorded from Mexico and Central America, but differs according to the characters given *punicipes* by Morley (Rev. Ichn. 3, 1914, pp. 59, 63) in having no carinae on the propodeum and no trace of areas, and in the male in having the hind tibiae and tarsi black with a white annulus on the basal half of the tibiae.

♀.—Shining black; the legs nearly morocco red (Ridgway), the front coxae blackish at base, the front legs often with a somewhat yellowish cast especially on the tibiae and tarsi, the hind tibiae slightly more brownish although rarely distinctly so, the hind tarsi still more brownish on the upper side, the last joint becoming fuscous at apex, all the claws blackish at apex, the femoro-trochanter articulation sometimes blackish; palpi yellowish brown, becoming fuscous on the basal joints; antennae brown, the flagellum shading into fuscous on the apical half, the scape black; the line marking the upper limits of the clypeal impression often more or less reddish brown especially at the sides; tegulae fuscous, becoming yellowish at base; spicula of ovipositor dark castaneous, the sheaths black; wings somewhat fuliginous, the veins and stigma mostly fuscous or blackish, the latter yellowish at base and the costal vein more or less yellowish on its basal half.

Head transverse, no wider than the thorax; the temples short, oblique; the eyes slightly emarginate internally; the frons deeply excavated to form the scrobes, with a slight median carina forking in front of the ocelli; face a little wider than long, convex, slightly protuberant medianly, with a slight indication of a median carina above; cheeks long; clypeus at apex truncate with a slight median emargination; antennae slender, perfectly filiform, the flagellum with 27 to 30 joints. Face and base of clypeus finely, rather closely punctate; the cheeks, temples, vertex and occiput comparatively impunctate, smooth and shining; the frons very finely punctate, the scrobes sometimes transversely aciculate in large specimens, but usually smooth in small specimens. Face with a moderately long, rather abundant yellowish pubescence, which becomes longer on the base of the clypeus and on the mandibles.

Notauli absent; the epicnemia bent forward on the pleura in a broad curve but rather widely separated from the propleura at either end; the propodeum without areas, only the pleural carinae being present, the spiracles rather small and oval. Propleura transversely aciculate except above; the mesoscutum and scutellum appearing impunctate under low magnification, but actually with very minute, rather close punctures, which become somewhat larger and very crowded on the anterior part of the scutum; mesopleura with a similar but somewhat more distinct puncturation above, becoming coarser and much closer below and on

the sternum, the prepectus, however, finely rugose; propodeum rugosely punctate becoming coarsely rugose dorsad, the petiolar region smooth, shining and limited above by transverse cariniform rugosities; the metapleura finely rugoso-punctate. Mesonotum with a much finer, shorter pubescence than on the face; that on the mesopleura a little longer than on the scutum and that on the propodeum as long and dense as on the face.

Abdomen about a third longer than the head and thorax; basal tergite slightly longer than its apical width, its basal half flattened, not or hardly excavated medianly, forming an obtuse angle with the apical, transverse part; the following tergites transverse, the second longest, the rest gradually shortening, the third and fourth widest; the second to fourth wtih a slight transverse impression on each side half way between the middle and apex, a longitudinal furrow on each side close to the lateral margin and a somewhat oblique furrow on either side on basal half just within the spiracles, the intervening area between these sulci forming a spiracular protuberance, which is smooth and shining with the spiracle located at its apical end, and forming a distinct although small emargination on the sides of the second and third tergites in dorsal aspect; apical margin of the first five tergites slightly elevated and impunctate, the basal half of the first, the basal margin of the second together with the three apical tergites also impunctate, smooth and shining, with a delicate reticulate surface sculpture except at base of first two segments; apical half of the first and the four following tergites otherwise densely, moderately coarsely punctate with round punctures, and hardly at all tuberculate either before or behind the transverse impression; the last tergite with two fine impressed lines meeting in an acute angle at the middle of the basal margin, the enclosed triangular area having the surface sculpture finer and smoother; pubescence rather conspicuous on the venter and wide epipleura, on the sides of the apical tergites and on the apical margin of the eighth tergite; the basal and middle tergites with an extremely fine or microscopic pubescence; ovipositor about one-half as long as the abdomen, its sheaths finely, densely pubescent.

Legs of the usual type, the front tibiae dorsally thickened at the middle and then somewhat rapidly constricted towards the apex; last joint of the tarsi about thrice as long as the fourth; the claws simple although greatly widened at base. Areolet of wings sessile, quadrangular, the transverse vein emitted beyond its middle; the discocubital vein slightly arcuate, usually not broken; apical abscissa of radius straight; nervulus a little postfurcal or sometimes interstitial; nervellus of hind wings broken somewhat more than half way above its middle.

Length: About 5 to 10 mm., smaller specimens being most abundant.

♂.—Similar to female, the antennae rarely brown, usually entirely fuscous or blackish; the hind tibiae and tarsi black, with the tibial spurs and a band from the middle half way to the base of the tibiae pale yellowish or white; the middle tibiae with a similar pattern, but the dark

parts much diluted or brownish and restricted to the dorsal side; apex of the last joint of the front and middle tarsi with their claws blackish.

Eyes less emarginate, the face more distinctly protuberant; antennae much stouter with the flagellum slightly attenuated towards the apex and composed of 26 to 29 joints. Abdomen about a half longer than the head and thorax, slenderer; the basal tergite about a half longer than wide, hardly narrowed at base, its basal part distinctly excavated and shorter than the apical portion, which is about as long as wide or a little longer; second tergite about as long as wide, or sometimes slightly longer than wide, the four following tergites about equally long and all transverse; the seventh tergite narrowed towards apex and about as long as its apical width; the eighth small and often retracted or concealed within the seventh, divided into two lobes by an oblique angulated suture down the middle, the left lobe overlapping the right, the cerci short and rather stout, situated on either side of the truncate apex; eighth ventrite triangular with the apex rounded, stipites (or valvulae) of the genitalia black, covered externally with a fine, white, moderately thick pubescence, somewhat over twice as long as wide at base, tapering to the rounded apex (sometimes appearing very acute at apex if folded in drying); sagittae united with a median suture evident, ligulate, about four times as long as wide at base, tapering very gradually to the rounded apex, apically curved downward and testaceous in color.

Sculpture for the most part much finer than in the female, especially on the propodeum and abdomen; the propodeum almost always with the transverse wrinkles on the disk much reduced or entirely absent especially in smaller specimens, the smooth area of the petiolar region then extending forward narrowly to the base; abdomen finely, closely punctate, with the puncturation finer on the apical tergites, being still distinct on the sixth, much less so on the seventh and absent on the eighth; apical margin of the first six tergites distinctly elevated and impunctate, and like the smoother parts of the following tergites very finely reticulate; the basal excavation of the first tergite smooth, shining and not reticulate.

Pubescence on the whole more abundant and prominent than in the female, being especially long and prominent on the sides of the propodeum; the tergites of abdomen except the eighth all rather densely pubescent with fine, short, white hair.

Length: 4 to 8 mm.

This species has been recorded from Hawaii, Lanai, Maui, Molokai and Oahu by Ashmead and also occurs on Kauai, where it has been collected by Terry, Swezey, Kusche and the writer. It is found at all elevations, but apparently it is quite as common if not more so in the lowlands, and is often abundant in Honolulu.

It was recorded by Kirkaldy (Hawaiian Forester & Agriculturist, 1, 1904, p. 209) as a parasite of *Omiodes accepta* Butler and of several unspecified Tineids and Tortricids from Perkins' rearings. Perkins (Proc. Haw. Ent. Soc. 1, 1906, p. 44) recorded it with other parasites from *Omiodes*, *Agrotis*, *Vanessa* and *Scotorythra*, so that some of these records almost certainly do not apply to this species. Swezey in 1907 (Ent. Bull., 5, Exper. Stat. H. S. P. A., p. 43) recorded it from Perkins' rearings as a parasite of *Omiodes accepta* and *O. blackburni* Butler, *Azinis hilarella* now known to be *Ethmia colonella* Walsingham, and two species of *Cacoecia*, at present known as *Archips postvittanus* (Walker) and *Amorbia emigratella* Busck. In 1915 Swezey (Proc. Haw. Ent. Soc., 3, p. 105) recorded it from the following additional hosts: *Cryptoblabes adiena* Swezey, *Euhyposmocoma ekaha* Swezey, *Cryptophlebia illepida* (Butler), *Pectinophora gossypiella* (Saunders) and *Hyposmocoma lituata* Walsingham. More recently Mr. Bridwell has reared it from *Cryptophlebia vulpes* Walsingham as well as from *C. illepida*.

It always issues from the pupae of its hosts, and pupates nearly nakedly within the empty pupal shell, as the larva does not spin a definite cocoon although it does line the shell with a comparatively small amount of silk.

Itoplectis immigrans n. sp.

A rather shining black species, with the first five segments of abdomen ferruginous, which in the non-emarginate clypeus, the deeply emarginate eyes, somewhat attenuated antennae, short cheeks, the simple claws of the middle and hind tarsi, obsolete notauli, rather small oval spiracles, and nervellus broken far above the middle agrees with *Itoplectis*, although the pubescence is neither especially long nor recumbent, and the front claws are also simple. The peculiar coarse and rugose sculpture of the abdomen is similar to that of certain species of *Hemipimpla*.

♀.—Head, mandibles, thorax and apex of abdomen rather shining black; the first five tergites of abdomen and sides of the sixth nearly

burnt sienna (Ridgway); palpi yellow; antennae pale brown with the scape and the articulations of the flagellum especially towards its base blackish; legs nearly concolorous with the base of abdomen, the front and middle coxae sometimes yellowish; basal half of the front and middle tibiae and the tarsi strongly yellowish, the apex of the last joint of the middle tarsi and especially of the hind tarsi blackish, of the front tarsi hardly darker; knee-joint of hind legs and apical fourth of the hind tibiae black; rest of the hind tibiae yellow, shading into ferruginous beyond the middle; tegulae and sometimes a small dot on the posterior dorsal corners of the propleura yellowish; ovipositor black, the spicula dark reddish brown; wings subhyaline, the veins mostly fuscous with the radix, costal vein, base of subcostal and base of the stigma brown or brownish yellow.

Head not quite so wide as the mesothorax, transverse, very strongly narrowed behind the eyes, the temples being moderately long, but very oblique and declivous; frons rather deeply excavated to form the scrobes, with a slight medial elevation in front of the ocelli; eyes strongly emarginate internally; face nearly quadrate, slightly narrowed towards the mouth, uniformly and rather strongly convex; clypeus impressed anteriorly and with the apical margin somewhat rounded; cheeks very short; antennae about three-fourths as long as the body, slender and nearly filiform although distinctly attenuated towards the base of the flagellum, the latter 22 to 23-jointed, with a very fine, soft, short and thick pubescence. Face, base of clypeus, and scape finely, closely punctate, the face with a short, impressed sculptureless line descending medially from the antennal scrobes; impressed part of clypeus, the frons, vertex, temples and occiput polished and smooth or with excessively fine punctures, especially on the temples, the raised portion of the frons in front of the ocelli very finely, closely punctate. The grey pubescence of the face moderately thick and half erect, and considerably longer on the base of the mandibles and clypeus; temples very finely pubescent.

Thorax short and stout, strongly narrowed before and behind the gibbous mesopleura; mesoscutum rather strongly convex, the notauli wholly absent, the scutellum slightly convex; mesopleura strongly gibbous below the superior longitudinal furrow, the protuberance above the furrow and just below the tegulae narrow, somewhat cariniform, and very much less elevated than the gibbous part below; epicnemia running nearly vertically upward on to the pleura, not much inclined forward and widely separated at the extremities from the propleural suture. Propodeum not very strongly convex above and weakly declivous posteriorly; pleural carina complete; the lateral carinae of the petiolar area distinct only to the obsolete apophyses, disappearing anteriorly so that the dentiparal and spiracular areas are more or less confluent; areolar carinae not greatly distant from each other, subparallel basally, continuing apically to beyond the apophyses, where they rapidly diverge and disappear; areola with the confluent basal area more than twice as long as wide, the petiolar region short and somewhat transverse, not bounded

by a transverse carina above; propodeal spiracles rather small and oval. Mesoscutum somewhat more coarsely and as closely punctate as the face; the pro- and mesopleura including the prepectus a little more finely and much more sparsely punctate than the face; scutellum and metanotum (postscutellum) more coarsely punctate than the mesoscutum; areola and petiolar area of propodeum smooth or nearly so, and sometimes separated from each other by transverse rugosities; dentiparal region much more coarsely punctate than the mesoscutum but more sparsely, the spiracular region confluently and as equally coarsely punctate, the pleural region with a finer, sparser puncturation. The mesoscutum pubescent like the face; the apex of scutellum and the propodeum with a much longer and more recumbent pubescence.

Abdomen somewhat less than twice as long as head and thorax together, elongate fusiform, as wide as the base of the propodeum but not so wide as the mesothorax, the tergites strongly convex from side to side; basal tergite distinctly longer than the hind coxae and about a third longer than its apical width, the discal carinae extending about to the middle, then continued as rounded ridges nearly to the apex between which the postpetiole is slightly longitudinally furrowed, and laterad of which it is strongly declivous with a lateral carina reaching to the spiracles; the latter located at one-third from base; following tergites transverse, and becoming gradually shorter towards the apex, the second being longest, the fourth and fifth the widest, and following two the most transverse; second to fifth tergites each with the usual oblique impression on each side at base, and a subapical transverse impression which curves forward on each side to intercept the oblique impression, the area on each side between the impressions very slightly inflated or indistinctly tuberculate, the lateral margins longitudinally depressed and enclosing with the oblique impressions a spiracular protuberance at the basal corners, visible in dorsal view with an emargination behind especially on the second and third tergites; the second tergite with linear, slightly oblique, deep gastrocoeli reaching nearly to the middle. First to fifth tergites coarsely, closely and more or less confluently rugosopunctate with oval punctures, the base of the first, however, smooth between the carinae, and the apical margin of the following segments very slightly elevated and smoothish behind the transverse impression, the depression on the lateral margins more finely punctate, and the spiracular protuberance and gastrocoeli smooth; sixth to eighth tergites with the punctuation similar to that of the mesopleura, the eighth somewhat more closely punctate and provided with two short impressed lines converging and meeting at the middle of the base or just in front of the basal margin, with the enclosed triangular area smooth. Epipleura (ventral portions of the tergites) rather wide but not strongly chitinized; the sixth ventrite (hypopygium) squarely and broadly truncate in front of the base of the ovipositor; protruded portion of the ovipositor about as long as the basal segment and a little longer than its basal or non-protruded portion, the sheaths taken together cylindrical, thickly covered with moderate

ly long black hair. The grey pubescence on the tergites short, recumbent and sparser than on the mesoscutum, longer, somewhat thicker and at least much more prominent, however, on the black apical segments.

Legs rather short and stout; the front tibiae a little swollen and faintly constricted beyond the middle; the hind femora somewhat swollen; the hind tarsi long, the apical joint thickened towards the apex, excluding the claws about five to six times as long as the fourth joint or nearly as long as the second to fourth joints combined which are equal to first; all the claws including those of the front tarsi simple, slightly thickened at base, moderately incurved at apex and rather small, the pulvilli shorter than the claws.

Areolet of front wings rather large, broadly sessile or almost pentagonal; the discocubital vein slightly arcuate and not broken; apical abscissa of the radius very nearly straight; nervulus interstitial, or only slightly antefurcal; nervellus of hind wings broken somewhat more than half-way above the middle.

Length: 8 mm., the ovipositor 1.25 mm.

♂ Similar in color to the female throughout; the first five segments of the abdomen ferruginous, the sixth segment black with the apical and basal margins narrowly ferruginous or varying to almost entirely pale except a narrow subapical blackish band; antennae slightly darker. Legs concolorous with base of abdomen, or the front and middle pair varying to yellow, with the upper side of the femora and the apex of the middle tibiae remaining a little darker or more reddish; the hind trochanters and basal part of the pale band on hind tibiae varying to yellowish; claws of front tarsi towards apex and their pulvillus, the apical third of the last joint of the middle and hind tarsi, apex of the first and second joints of the hind tarsi, apex of hind femora and base of hind tibiae narrowly, with the apex of the latter more broadly, black or blackish.

Eyes rather more deeply emarginate than in female; the antennae considerably stouter, the flagellum composed of 23 to 24 joints, attenuated at base and somewhat less so towards apex; head otherwise, and the thorax as in female. Abdomen proportionately slightly longer and narrower than in the female, the segments less transverse since the eighth is usually nearly entirely retracted within the seventh, whereas it is always prominent in the female; basal tergite about a third longer than its apical width, strongly constricted at base, the basal third obliquely declivous with two dorsal carinae which strongly converge but do not meet posteriorly, the enclosed area slightly excavated and more deeply so at the base; the apical part nearly quadrate, slightly and broadly furrowed medially, declivous on the sides and with lateral carinae behind the spiracles which are situated a little before the middle of the segment; second tergite not greatly wider than long, the third to fifth the most transverse, the sixth a little longer than the preceding segment, the seventh triangular with the apex rounded, as long as wide, and a little longer than the sixth; eighth tergite when drawn or dissected out is

found to be divided by a median unchitinized area into two lobes, the right lobe overlapping the left; the cerci short and thick, inserted on either side of the truncate apex. Eighth ventrite similar in shape to the seventh tergite but not more than one-half as large; stipites (valvulae) of the genitalia black, covered externally with a fine, black pubescence, not very wide at base, somewhat over twice as long as the basal width, and tapering towards the rounded apex; sagittae piceous, united to form a ligulate organ about three times as long as wide, and somewhat curved downward at the acute apex. Wings and legs as in female, but the tarsi slightly shorter, the apical joint not quite so elongate, the claws rather larger and more curved at apex.

Sculpture and impressions very nearly the same throughout as in the female, but the spiracular protuberance at the basal corners of the tergites smaller, the basal segment smoothish between the carinae on the basal third, becoming punctate above between the apices of the carinae; and a longitudinal, median impression present on the second tergite between the gastrocoeli. Pubescence similar throughout to that of female, but considerably longer on the face and somewhat longer on the propodeum.

Length: 6.75 to 9 mm.

Described from two females, four males, all except one collected by Mr. Swezey. Type female, Mt. View, Hawaii, Aug. 22, 1912; paratype female, Ookala, Hawaii, Mar. 22, 1906; allotype male, Ninlii, Hawaii, May 19, 1917; paratype male, Pahala, Hawaii, May 21, 1915; paratype male, Kohala, Hawaii, June 1909 (F. W. Terry); paratype male, Kipahulu, Maui, July 15, 1906. Types in the collection of the Hawaiian Entomological Society.

This species does not occur on Oahu apparently, as it can hardly be the undetermined "*Pimpla*" species mentioned by Perkins (Fauna Hawaiiensis, 2, part 6, 1910, p. 676), since under any ordinary circumstances it would not be called "commonplace".

Note on Hawaiian Platynus (Coleoptera, Carabidae).

BY DR. R. C. L. PERKINS.

(Presented by O. H. Swezey.)

In the "Fauna Hawaiiensis" two species of *Platynus* were described by Dr. Sharp, one from Haleakala, Maui, and the other from Kauai. Neither of the species was found in any numbers, and of the latter, *P. ambiens* Shp., only a single example was captured, although a large number of Carabidae was collected on Kauai, and these were to some extent examined at the time of capture, in order that I might have a good idea of the number of species that were being collected.

Recently I came across a small tube of Kauai beetles, preserved many years ago in alcohol for purposes of dissection, and was surprised to find that three of the five examples of Carabidae belonged to *Platynus ambiens*, the others being the two very common species *Metromenus paridus* and *Disenochus aterrimus*. A very aberrant female specimen of *Rhyncogonus kauaiensis*, a few common *Proterhinus*, etc., made up the rest of the contents of the tube. It is remarkable that these few beetles picked up at random should have contained more of the *Platynus* than were found when such things were specially looked for. I may add that though these beetles had remained so many years in alcohol, they were in the best of condition and were easily mounted.

Though placed in the same genus, the two Hawaiian *Platynus* are extraordinarily different in structure and but for the pronotal setae being alike in each, they certainly would not be placed together, since each of them is far more like to some other species of Hawaiian Carabidae placed in other genera than its congener. I have not compared my specimens with the type, but Sharp's description agrees with them so admirably that there is no probability of error; indeed, there is little difficulty in identifying nearly all the Carabidae by the

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descriptions in the "Fauna", so far as my experience goes.

Platynus ambiens has one peculiar character in that the pronotum along its posterior margin has distinct and fairly numerous punctures; and therein somewhat resembles some members of the *Discochus* group (e.g. *Mauna*) though I cannot remember to have observed this in any of the *Metromenus* section.

NOTES AND EXHIBITIONS.

Dolichurus stantoni.—Mr. Bridwell recorded this roach parasite abundant on the south ridge of Kalihi Valley, April 27th; two specimens were captured and half a dozen others observed.

Scolia manilae.—Mr. Timberlake recorded the finding of this wasp established at Lahaina, Maui, April 12th. Mr. Swezey reported its spread to the coast west of Ewa Plantation on Oahu, where it was found flying over *Vitex trifolia* and *Ipomoea pes-caprae*. Mr. Osborn found it recently at Wahiawa, Oahu. Quite a rapid spread for a new introduction.

Pseudogonatopus hospes.—Mr. Swezey mentioned this Chinese Dryinid leafhopper parasite as a contrast to the above, for nothing was seen of it from 1906-7, when it was introduced and bred colonies sent around to the different sugar plantations, until 1916, when it was first recovered in the field, and was found to be quite generally established in the plantations of Oahu.

Tenodera sinensis.—Mr. Swezey exhibited a female mantis which he had captured alive on the S.S. Mauna Kea shortly after leaving Hilo, Hawaii, March 3rd, 1919. She had been kept alive until her death May 1st. She produced four egg-masses on the following dates: March 24, April 4, April 13, April 25.

Plagithmysus sp.*—Mr. Swezey exhibited a series of 7

*Described by Dr. Perkins as *Plagithmysus platydesmae*, see page 345 following. (Ed.)

specimens of this beetle bred from larvae found in *Platydesma campanulata* near Glenwood, Hawaii, March 2nd, 1919. They are strongly marked with yellow, and apparently an undescribed species.

Megatrioza palmicola.—Mr. Crawford reported that on examination of Psyllid adults and nymphs from palm from Glenwood, Hawaii, handed him by Mr. Swezey, he considered them identical with or a variation of the species on palm on Oahu. The nymphs of the Hawaii form have the marginal hairs or projections much enlarged.

Psyllids from Punaluu.—Mr. Bridwell exhibited two species of Psyllids from Punaluu, both apparently new.

JUNE 5th, 1919.

The 165th meeting of the Society was held in the usual place Vice-President Crawford in the chair. Other members present: Messrs. Bridwell, Fullaway, Pemberton, Rosa, Swezey and Timberlake. Professor H. E. Gregory, Acting Director of the Bishop Museum, was present as a visitor.

Minutes of previous meeting were read and approved.

Mr. Swezey presented a letter from the Director of the Experiment Station, H. S. P. A., extending to the Society the privilege of making the experiment station building its headquarters as well as a depository for its library and collections.

PAPER.

The Insect Fauna of the Hawaiian Bunch Grasses (Eragrostis variabilis and Allies).

BY JOHN COLBURN BRIDWELL.

There are several species of *Eragrostis* in the Hawaiian Islands which are closely allied and have similar habitus, occurring usually in the bare wind-swept pali faces, sometimes in rather moist localities, sometimes in regions which re-

ceive only occasional showers. They are also not infrequently found in the forests where the slopes are abrupt and in some instances these grasses are to be found growing at only a few feet above sea level. All the species when growing in the wind-swept regions have long drooping leaves and rather short stout stems. They are always in bunches or tussocks, often a foot across.

These grasses appear to have attracted but little attention from the early entomologists. Blackburn found one species of *Coryloplus*, which he recorded as occurring on grasses which probably occurred in bunch grass.

Mr. O. H. Swezey first found an endemic insect connected with bunch grass in 1906, which Kirkaldy described as *Kelisia swezeyi* without indication of the host plant and without recognizing its endemic nature. Ten years later a second species of *Kelisia* was found by Mr. Swezey in June, 1916, and described as *Kelisia emoloa* by Mr. Muir. Since that time much attention has been devoted to collections upon *Eragrostis* by Swezey, Timberlake, Fullaway, Giffard and the writer. These investigations have shown that the bunch grasses have a peculiar fauna of their own with several clearly endemic species, and that the tussocks furnish shelter for several other insects. This fauna has been best worked on Oahu but a few species have been studied elsewhere. It is noticeable that many of the species found in bunch grass also affect the sand-binding grass, *Sporobolus virginicus*.

Our present knowledge of the entomology of the bunch grasses may be summarized as follows:

Coleoptera.

COCCINELLIDAE.

Diomus discedens (Sharp).

This species was originally found by Blackburn and described by Dr. Sharp as a *Scymnus* but indicated as probably forming another genus. Mr. Timberlake, who has studied the species, permits me to use his unpublished reference of this

species to *Diomus*. It seems to be particularly attached to the bunch grasses and has been repeatedly taken there, but is also found in Bermuda grass.

ELATERIDAE.

At least two species of endemic Elateridae have been found in bunch grass. Several specimens of one were found in bunch grass in Iao Valley, Maui, and two specimens of another on the Manoa Ridge, Oahu (Bridwell).

CORYLOPHIDAE.

Gronevus rotundus (Sharp).

This little blackish beetle was found commonly on Manoa Ridge, June, 1919 (Bridwell). The intestinal canal of specimens examined microscopically were stuffed with fungus spores.

This species, described by Dr. Sharp as a *Corylophus* and later transferred by Matthews to his genus *Corylophodes*, appears to belong to Casey's genus *Gronevus*.

Another species which I have not seen was taken at roots of grass at the Nuuanu Pali by Blackburn and described as *Corylophus suturalis* Sharp. This has been referred to *Corylophodes* by Matthews. This may also belong to *Gronevus*.

HOMOPTERA.

DELPHACIDAE.

Kelisia swezeyi Kirkaldy.

In Kalihi, Nuuanu and Manoa Valleys in the Koolau Mts., Mt. Kaala in the Waianae Mts., on *Eragrostis*. Also on the similar sedge *Gahnia*, Kaumuohona and Palolo Crater in the Koolau Mts. Apparently prefers the moister portions of the mountains.

Kelisia emoloa Muir.

Kulionou, Wailupe, Waialae, Palolo, Manoa. Seems to prefer the dry ends of the lateral ridges.

Kelisia eragrosticola Muir.

Iao Valley, Maui (Giffard, Fullaway, Bridwell), Kalihi Valley, Oahu (Timberlake and Bridwell).

Kelisia sporoboricola Kirkland.

Taken on *Eragrostis atropioides* at an elevation of 7500 ft. on Haleakala, Maui (Bridwell). This has otherwise been found on Oahu, Maui and Hawaii near sea level on *Sporobolus virginicus*.

CICADELLIDAE.

Three undetermined species of *Nesosteles* have been taken. One is abundant everywhere on Oahu where the bunch grass grows. One was taken in Iao Valley, Maui, and another on *E. atropioides* on Haleakala, Maui (Bridwell).

Messrs. Giffard and Fullaway found a Cicadellid on *Eragrostis* on Diamond Head, supposedly immigrant. The genus and species have not been determined but it certainly is not any of the described genera known from the Islands. The recent discovery by Mr. Giffard of this species in the mountains of Hawaii probably indicates that it is endemic.

COCCIDAE.

The bunch grasses are commonly infested with mealy bugs supposed to be *Trionymus insularis* Ehrhorn. Whether other species occur is unknown, but the diverse species of mealy bug parasites found suggests the desirability of a further investigation of the Coccidae.

A species of *Pseudococcus* has also been taken on Diamond Head which has received a manuscript name by Mr. Ehrhorn.

HETEROPTERA.

LYGAEIDAE.

A species, *Nesocymus* sp., has been found abundant at the Nuuanu Pali.

Two specimens of a different but closely related Lygaeid

were found on the Manoa Ridge (Bridwell). Later the same species was found by Mr. Timberlake along the Bowman trail on the ridge Ewa of Kalihi. It has also been taken at sea level at Barber's Point and Makapuu Point (Bridwell) on *Sporobolus virginicus*.

Hymenoptera.

DRYINIDAE.

The *Nesosteles* found on Oahu is very commonly parasitized by an undescribed species of *Gonatopus*.

Kelisia swezeyi is occasionally attacked by *Pseudogonatopus perkinsi* (Ashmead).

ENCYRTIDAE.

The genus *Xanthoencyrtus* has been recently found to be represented by several wingless Hawaiian species attached to mealy bugs on *Eragrostis*. Mr. Timberlake has worked up the species.

FORMICIDAE.

Several species of ants frequent the bunches.

Thysanura.

Mr. Timberlake took a large species *(Machilis)* on the Waianae side of Mt. Kaala in bunch grass.

Corrodentia.

Several undetermined *Psocidae* are found in bunch grass on Oahu.

Orthoptera.

BLATTIDAE.

Polyzosteria soror Brunner, is very common in the bunch grass on dry ends of the lateral ridges on Oahu.

Thysanoptera.

An single individual of a peculiar thrips was found on the

Manoa Ridge (Bridwell). Several individuals of another species were found near sea level near Makapuu Point (Bridwell).

Lepidoptera.

NOCTUIDAE.

Cirphis pyrrhias (Meyrick) and **C. amblycasis** (Meyrick).

Swezey has found the larvae of these moths in the tussocks and other species of Noctuids also are not uncommon.

A number of the moths feeding in vegetable debris utilize the decaying leaves and stems in the tussocks.

DISCUSSION.

Prof. Gregory responded to an invitation to address the Society, centering his remarks on the theme, "What Does the Hawaiian Entomological Society Wish the Bishop Museum to Do to Promote Entomology?" At the conclusion of Prof. Gregory's address, Mr. Swezey replied for the Society, and after some discussion it was moved and duly seconded and carried that the Society hold a special meeting on June 17th to discuss the subject and formulate a reply to Prof. Gregory's question.

NOTES AND EXHIBITIONS.

Jassid on Amarantus.—Mr. Bridwell reported finding this Jassid at Waianae. He believes it to be a species of *Empoasca* different from any of the described species in the United States. There is, however, a green species doing damage to sugar beets in California, with which he has not been able to compare it.

Rhyncogonus sp.—Mr. Bridwell reported finding at Waianae the wing covers of a species of *Rhyncogonus* different from any previously described.

Corixa sp.—Mr. Bridwell reported finding at Waianae a species of *Corixa* swimming in pools formed by the splash of the waves on the coast.

Silaon sp.—Mr. Bridwell reported finding at Waianae a species of *Silaon*—a new record for Hawaii.

Spider in Insect Boxes.—Mr. Bridwell reported finding a peculiar little spider frequenting insect boxes. It resembles a mite and differs from ordinary spiders in having a chitinous plate above and below. Probably belongs to the genus *Scaphiella* in the Family Onopidae. Another similar spider, but probably belonging to a different genus, was found in bunch grass.

Bibionid.—Mr. Bridwell reported finding in a salt marsh at Waikiki on May 30th an additional species of Bibionid fly. This species probably belongs to the genus *Scalopsis*. Another species found in these Islands is referred to a different genus. He also reported finding rather numerouly a species of *Ceratopogon*, of which genus there is a different species in the mountains.

Cephalonomia.—Mr. Bridwell also reported finding in sedge in the Waikiki marshes, a species of *Cephalonomia*, but different from the brown species obtained by Mr. Swezey from Bermuda grass, and from two others found here.

Microbracon swezeyi.—Mr. Bridwell reported capturing eight additional specimens of this species, bred by Mr. Swezey from different lepidopterous larvae in sedges on the salt marshes.

Proterhinus maurus.—Mr. Bridwell reported an additional locality for this species about half a mile from the only other known locality where it occurs, on the same peculiar species of *Sattonia*. The other locality referred to is on the left-hand or west side of Palolo Valley, this locality is to the east side of Palolo Crater on the main ridge of the Koolau Mountains.

Sierola from Macao.—Mr. Bridwell reported finding in the material collected by Mr. Muir at Macao, a specimen referred to this genus, which was previously known only from Hawaii, Fiji, Australia and New Zealand.

Agrion xanthomelas De Selys.—Mr. Bridwell reported

noticing this species of *Agrion* common in the lowlands. Species of this genus are all considered endemic and the others seem to be confined to the mountains.

New Genus of Encyrtidae.—Mr. Timberlake exhibited specimens of an Encyrtid which appears to be new and which will constitute a new genus of Encyrtidae near *Oencyrtus* Ashmead. Only two specimens have been seen so far, one taken by Mr. Bridwell at Palolo Crater three or four months ago and one recently taken by himself on the west side of Mt. Kaala above Waianae. Whether it is endemic or not is not known.

*Hormiopterus vagrans.**—Mr. Timberlake reported taking this Braconid in the same locality (west side of Mt. Kaala above Waianae). It has previously been taken only in the S. E. Koolau mountains and on the lowlands.

Nesophryne sp.—Mr. Timberlake exhibited a specimen of a thick-set Jassid belonging to this genus, which he had collected recently on west side of Mt. Kaala above Waianae. Two other species of the genus have been previously collected on Oahu; one of these was taken by Bridwell, Swezey and Timberlake, the other only by Mr. Bridwell on windward side of Konahuanui (Malamalama).

Hburnia oahuensis.—This leaf-hopper was also taken by Mr. Timberlake in the above locality (west side Mt. Kaala above Waianae) recently, on its usual host-plant *Charpentiera.*

Holochlora venosa.—Mr. Swezey exhibited a female specimen of this large katydid which he collected May 25th on the top of Lanihuli Peak. This is the highest elevation and the greatest distance from Honolulu that the insect has been taken. It has also been found by Mr. Bridwell on the Bowman Trail.

Lagocheirus obsoletus.—Mr. Swezey exhibited specimens of the adult, larvae and pupae of this Cerambycid beetle taken from a standing dead kukui trunk, May 30th, on Wailupe

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*Described on page 300 following. (Ed.)

Ridge. Apparently the tree had been destroyed by the windstorm of December 2-3, 1918. The standing portion of the trunk had been invaded by this beetle. The larvae had eaten the whole inner layer of bark and the outer part of the wood slightly. Some of the larvae had burrowed into the wood for pupation, but others had remained where they had been feeding beneath the bark.

A full grown larva of *Chalcolepidius erythroloma* was also found under the bark. Being predacious, it had probably been feeding on the other larvae.

Dolichurus stantoni.—A pair of this Philippine roach parasite was exhibited by Mr. Swezey, taken on Wailupe Ridge May 30th. The wasp was introduced less than two years ago. This is the farthest east it is known to have spread. It has already been recovered on Mt. Tantalus, Lanihuli Ridge, Kalihi, and in the cane fields as far west as above Pearl City.

Aloha kirkaldyi.—A specimen was exhibited, and Mr. Swezey reported collecting half a dozen of this Delphacid on *Euphorbia* May 25th along the trail leading up to Lanihuli from the upper part of Nuuanu Valley. This insect had previously been collected at Punaluu and the eastern slopes of Mt. Kaala.

Kelisia swezeyi.—Mr. Swezey exhibited a single male specimen of this Delphacid taken June 1st on *Eragrostis variabilis* growing at an elevation of 2800 feet above Waianae Valley. This extends the range of this insect, it having been previously collected in Palolo, Manoa, Nuuanu and on the east slope of Mt. Kaala.

Dictyophorodelphax mirabilis.—Mr. Swezey exhibited a specimen and reported collecting this strange Delphacid on *Euphorbia hillebrandi* at an elevation of 2500 feet above Waianae Valley. This extends the range of the insect farther towards the northwestern extremity of the island. The previously known western limit was the east side of Mt. Kaala, where it was collected in 1916. It has so far been collected but a lit-

tle to the east from the Kaumnohona locality, where it was first discovered in 1906.

Cerotrioza bivittata.—Mr. Swezey reported having collected 13 specimens of this small Psyllid from *Xylosoma hawaiiense* on Wailupe Ridge, May 30th. This is probably as many as all that have been previously collected. The nymphs were found on the leaves feeding externally without being in a gall, but in a slight depression. This was surrounded by a red spot.

Scelodermus chilonellae.—Mr. Swezey reported finding this wingless parasite of lepidopterous wood-feeding larvae, on Wailupe Ridge, May 30th, in dead *Smilax*. It had previously been taken only on Tantalus.

JUNE 17th, 1919.

A special meeting of the Hawaiian Entomological Society was held in the usual place, Vice-President Crawford in the chair. Other members present: Messrs. Crawford, Bridwell, Timberlake, Swezey, Osborn, Rosa, and Pemberton.

The meeting was held to hear and consider the report of a special committee appointed to formulate recommendations to the Bishop Museum in regard to future needs and opportunities for entomological work to be conducted by this institution.

The recommendations of the Committee, as adopted after considerable discussion, were as follows:

Recommendations by the Hawaiian Entomological Society of the Lines of Entomological Work Which Would Appropriately Fall Within the Scope of the Bishop Museum.

The Hawaiian Entomological Society, having been asked by Dr. Herbert Gregory, Director of the Bishop Museum, for an expression of opinion as to what the Society considered the part that the Museum should have in the Entomological work of the Hawaiian Islands, presents the following recommendations, formulated by a special committee and adopted after dis-

cussion at a special meeting of the Society called for that purpose, June 17th:

1. A Descriptive Card Catalogue of all insects recorded in Hawaii should be compiled and maintained at the Museum; and a Check List and Bibliography should be printed. This is necessary as a basis for future work, in order that what has already been done may readily be ascertained and where to find it in the literature. Ultimately, similar Catalogues should be prepared for the whole Pacific. The Library should be made as complete as possible in literature on Hawaiian entomology; in fact, for that matter, inclusive of the whole Pacific, ultimately. (It is advisable, if it is possible to do so, that the entomological books of the Library be made available for withdrawal when desired for use outside by the entomologists of the other Institutions on occasions when it is impossible or inconvenient for them to spend the necessary time at the Museum to make use of them.)

2. At the Museum should be acquired and maintained available for study, the most complete Reference Collection of Hawaiian insects in the Islands. At present, the Museum has in the Perkins collection a very substantial beginning for this. It contains 64% of the species known and listed at the time the "Fauna Hawaiiensis" was published. Many new species have been described since then, new immigrants have arrived, and there have been many insects purposely introduced on account of their economic importance. The Museum collection should contain specimens of all of these. The entomologists of the other Institutions of the Territory are ready to coöperate in bringing the Museum collection to completion. The introduced insects can readily be supplied.

Much will remain, however, for the Museum to do in the way of expeditions to particular localities of the Islands for securing specimens of species now lacking in the collection, as well as search for new species, which are continually being found by the incidental collecting trips of the entomologists of

the other Institutions. There are many localities where the native forests are rapidly disappearing, in which insect collecting should be thoroughly done before it is too late. Some such places are the Kohala Mountains, slopes of Hualalai and other parts of Kona, and other regions of the forest slopes of Mauna Loa and Mauna Kea on the Island of Hawaii; Ulupalakua and other parts of the slopes of Haleakala on Maui; and similar conditions on the other Islands where the forests are receding, due to the advancing of agricultural interests and further encroachment of the cattle on the ranges.

Many desirable places for collecting where the forests are still in good condition, are much better accessible at present than when Dr. Perkins was collecting. For example: Waiahole, Wahiawa, and Punaluu of the Koolau Mountains of this Island, and many places on the other Islands where the rain forests have been penetrated to their hearts by the great ditches to secure water for irrigation purposes on the sugar plantations. These regions should be explored for insects, and it is to be expected that rich results would be attained as has already resulted from their botanical exploration.

3. "Types." The Entomological Society has established a "type collection" to contain the "types" of new species described by its members, and to be in the custody of certain of its officers, and for the present, located at the entomological laboratory of the Hawaiian Sugar Planters' Experiment Station, where the Society has its headquarters. It seems, however, that logically the Museum should eventually become the depository for "types", when proper or satisfactory organization has been effected for carrying on entomological work at the Museum.

4. There are problems of interest in distribution, both locally and for the whole Pacific, which would naturally fall within the scope of work of the Museum. As is well known in other Natural History branches here, this is a very important line of research here. Much more insect collecting is desirable for a basis for consideration of these problems.

5. Biological Problems. There is no end to work along these lines. In the "Introduction" to the "Fauna Hawaiiensis", Dr. Perkins has given a substantial basis for future work in this direction, but by reference to this work, it is readily seen that there is a great deal to be done in the study of the habits of Hawaiian insects, their life-histories, their relations to food-plants, relations of parasites to hosts, etc., etc. The entomologists of the other institutions are continually making some advances in these lines, but in the main it is only incidental to their work. The greater share of this falls within the scope of the Museum. Work of this nature would be greatly facilitated by the establishment of a Mountain Camp which could be used conjointly by the other departments of Natural History at the Museum.

6. Provision for the publication of entomological papers naturally follows; not to replace the "Proceedings" of the Hawaiian Entomological Society, but for the publication of results obtained in any line of entomological work at the Museum, as well as taxonomic papers prepared by any of the entomologists.

7. The Entomological Society has considerable interest in the Entomology of the Pacific as a whole and recognizes the importance of such study and its bearings on many of the problems of the Pacific. It feels that the Bishop Museum would be the logical center for this line of research.

8. The Entomological Society is ready to coöperate in much of what is outlined above as far as the different members are able, but it seems necessary for accomplishing substantial advancement in the lines of work suggested, that an Entomological Staff be maintained at the Museum.

D. L. Crawford,
O. H. Swezey,
J. C. Bridwell,
D. T. Fullaway,
Committee.

JULY 3rd, 1919.

The 166th meeting of the Society was held in the usual place, Vice-President Crawford in the chair. Other members present were: Brother Matthias Newell of Hilo, Messrs. Grinnell, Bridwell, Timberlake, Willard, Osborn, Ehrhorn, Swezey, Potter, Rosa, and Fullaway. Messrs. Bryan and Stickney were visitors.

The minutes of the previous meeting and of special meeting held June 17th were read and approved with corrections.

PAPERS.

Some Notes on Hawaiian and Other Bethlylidae (Hymenoptera) With the Description of a New Genus and Species. 2nd Paper.

BY JOHN COLBURN BRIDWELL.

11. The Biology of Sclerodermus.

Sir Sidney Smith Saunders bred adults of this genus from twigs in which were enclosed the nests of *Odynerus* and other wasps, the *Odynerus* nests containing caterpillars as food for the wasp grubs. Another investigator observed a group of Hymenopterous larvae upon a Cerambycid larva and later bred from these some adult *Scleroderma*. Mr. O. H. Swezey bred an endemic Hawaiian species from the larva of a wood boring moth, *Hyposmocoma chilonella*. The writer has found several other Hawaiian species associated with other similar moth larvae and a supposedly immigrant species described by him as *S. immigrans*, was found attacking the cocooned larva of the Bruchid, *Caryoborus gonagra*.

The discovery of this species in association with *Neoclytarlus euphorbiae* Bridwell on the Ewa Coral Plain in June, 1919, and subsequently generally distributed over the lowlands of Oahu associated with the larvae of other wood boring beetles, has enabled me to work out in considerable detail the

life history and habits of this species and to find a method by which the endemic species could be bred in the lowlands.

Variation and Dimorphism. These studies have revealed genetic problems of great interest which it seems desirable to have investigated in earnest and with adequate resources in the near future. There are, as disclosed by the work of the past year, in this easily bred species four forms of adults: (1) an alate female occurring in large numbers but probably not more than half as numerous as the (2) apterous female and (3) an alate male and an exceedingly rare (4) apterous male. Besides these dimorphs in each sex, the females are exceedingly variable in coloration with a range of color from honey yellow with only the slightest traces of infuscation to forms appearing almost wholly black, only the propodeum showing traces of paler coloration. Since the supposed species among the endemic forms have been described mainly on color characters, it is desirable that the whole question of the relation of these various forms should be attacked by breeding methods. While some of the species are known to possess good structural characters separating them, it is desirable to investigate the whole question of the relation of the various forms.

All the species studied have shown much similarity of habits and the life history of the species may be generalized in this way.

Emergence and Mating. The males emerge from the massed cocoons before the females and under ordinary conditions are present in not more than one-fifth the numbers of the females. The males on emerging from their own cocoons soon gnaw their way into the cocoons of the females and mate there and continue doing so until the females have emerged. The female which has laid the mass of eggs remains with the feeding larvae usually until the larvae have cocooned and sometimes, at least, until her progeny have emerged, and under these conditions she may become re-impregnated by her

own offspring. In any case the females are usually fertilized by close in-breeding, either fraternal or filial. Out-breeding is not however excluded, for in some of these masses of cocoons the males fail to complete their transformations and these females may be impregnated by strange males and a female which has left her cocoon mass after laying most of her impregnated eggs may encounter and mate with a strange male. In every case studied the eggs laid by unimpregnated females produced only males, as seems to be general among the Bethylidae. Mr. Busck's observations on *Perisierola* to the contrary have not agreed with my experience with the same species and Mr. H. F. Willard has conducted a long series of as yet unpublished experiments in which isolated females have never produced female progeny.

The emerging females also assist the others to emerge and remain together upon the cocoon mass for some days and before the colony scatters the cocoons are almost entirely destroyed, apparently being eaten by the adults.

Food. Careful examination of the habits of the adults have failed to disclose any habitual use of food other than that furnished by the prey. Saccharine substances such as honey or sugar and water were always refused and water was refused unless after a period of starvation. Adult females placed with bits of the pulp of banana at first refused it but fed upon it freely after it had fermented and developed a growth of moulds. The males upon being placed with females with their prey fed in the same manner.

Conflict with the Prey. The conflict between the *Scelerodermus* and her prey was quite peculiar and certain differences were revealed between *S. immigrans* ordinarily utilizing Coleopterous larvae and the endemic species which habitually attack the more aggressive Lepidopterous larvae, but in either case the first attack was directed toward the mouth and seemed designed to paralyze the mandibles. In this attack the *Scelerodermus* holds herself straight and attacks backward,

seeming like an animated dagger directed at the mouth of her prey. This moment of attack is the most dangerous of the ordinary life of the insect and is always preceded by a careful examination of the surroundings and the establishing of special means of retreat by gnawing away retreats into the rotten wood if this is necessary. Even with these precautions taken, if the prey is active and particularly if it is a species with powerful mandibular development the conflict may result in the death of the *Sclerodermus*. Many such deaths were observed under experimental conditions when *Scleroderma immigrans* was placed with the larger Cerambycid larvae, such as those of *Lagocheirus obsoletus* Thomson, *Coptops aedificator* (Fabricius), and even *Prosoplus barkii* (Fabricius), and it was also the case in many instances with the endemic species in conflict with Lepidopterous larvae.

After the initial attack upon the head, the *Scleroderma* proceeds more at leisure to paralyze the remainder of the larva and this is frequently a long drawn out and protracted process. While some particular effort seemed to be directed toward the presumed position of thoracic and anal ganglia, the observation of hundreds of such struggles has convinced me that the stinging reflex is in no way precise but that sooner or later the grub will be stung in every region which gives a muscular response to the feeding of the female or to her exploratory movements over the body of the grub. To me it seems the venom is injected into the body fluid and produces its paralyzing effect when finally it comes in contact with the nerve centers. Frequently the earlier stinging did not result in complete and permanent paralysis and in cases where the female was removed from the prey soon after oviposition, the grubs revived and were able to dislodge the feeding larvae of *Scleroderma*. The venom did not appear to arrest the transformations of beetle larvae if they had been attacked during the prepupal stage after completing feeding and instances occurred where such larvae completed their transformations after the larvae of *Scleroderma* had begun to feed.

Tolerance. It is of interest that in several cases more than one female was found in the field associated with a single host larva. In experimental work along this line there seemed to be no limit whatever to the number of *Sclerodermus immigrans* which would simultaneously but without any particular cooperation join in mastering a single beetle grub and the relatively enormous full-grown grubs of *Nystrocera globosa* (Olivier) and *Aegosoma reflexum* Karsch were always ultimately overcome if enough individuals were placed with them. Further, these females invariably lived in harmony upon the paralyzed prey, oviposited, and the progeny of the different females fed and reached maturity without interference from the others. This tolerance extended even to the grubs of other species of *Sclerodermus* and, while the experimental work was not continued as long as is desirable, adults of different species were secured which had developed together on the same larva. This interspecific tolerance is the more surprising from the fact that *Sclerodermus immigrans* readily attacked and fed upon and its grubs developed to adults on the grubs of bees of the genus *Nesoprosopis*; of the fossorial wasps *Crabo* and *Sceliphron*; the ants, *Tetramorium guineense* (Fabricius) and *Camponotus maculatus* (Fabricius), and even the Braconid and Chalcidoid parasites, *Hormiopterus* and *Eupelmus* which were associated with the *Neoclytarlus*.

Conflicts of Sclerodermus immigrans with its Prey. A female was observed attempting to sting the prepupal larva of *Neoclytarlus euphorbiae*. She grasped the edges of the sutures of the middle of the abdomen with her mandibles and holding on with her legs, curved her abdomen and body around the larva attempted to sting it on the ventral side in the vicinity of the suture between the fifth and sixth segments. The larva responded to this effort by violent contortions during which it rotated first in one direction and then in the other, but without being able to dislodge the *Sclerodermus*. I could not make out whether she was able to penetrate its skin with her sting.

A female placed with a larva of *Neoclytarlus* was ob-

served stinging it about the head, sometimes barely escaping the jaws of the larva. After much effort directed against the head, she was seen stinging it near the center of the mesosternum and in the suture between the mesosternum and prosternum and worked her way along the sides of the segments to near the anal extremity, apparently stinging wherever she secured a response to her prodding with the end of the abdomen. She then returned to the head, prodding tentatively about the mouth, then made a long sustained sting in the middle of the pro-mesonotal suture and another perhaps at the anterior margin of the first tergite laterally. At the end of this operation she had difficulty in removing her sting and in the struggle to extricate it, it was seen to be very elongate so as to penetrate nearly or quite half through the larva. After this the larva became quiescent and she began pinching the cuticle with her mandibles in feeding.

Another female of this species which had been placed with a nearly full fed larva of *Prosoplus* in a twig, had not paralyzed it and this larva was removed from the twig and placed with the *Sclerodermus* female. After some time she was observed in conflict with it, attacking it near the middle of its abdomen. The *Prosoplus* larva was strong and vigorous, larger than the *Neoclytarlus* larva from which the material from Ewa Coral Plain has been bred and its skin is apparently tougher. The struggles, contortions, twistings and rotations of the *Prosoplus* larva did not once serve to dislodge her. Grasping the cuticle of the edges of the sutures, she was constantly endeavoring to sting, apparently without much choice of position. Occasionally she was able to deflect the end of her abdomen nearly vertically to the surface and held this position, the rest of her body well curved round the body of the *Prosoplus*. It was doubtless then that she did her most successful stinging. In the struggles she worked her way backward and forward above the body of the *Prosoplus* and around and around, constantly stinging or attempting to do so. During the latter part of the combat she seemed to

concentrate more of her efforts toward the thorax and head, two or three times she worked about the head as if attempting to sting there, while the *Prosoplus* attempted to grasp the end of her abdomen. At length the struggles of the *Prosoplus* grew weaker and weaker and she was able to pursue her work more easily and could occasionally clean away the wood dust which had accumulated on her body. She proceeded to the anal extremity of the body and carefully and deliberately stung in the sutures there two or three times near the lateral margin and then worked her way along the body, inflicting a sting apparently wherever she could get a response to her gnawing the surface, working along thus to the head. By this time the larva was practically immobile and from time to time she would rest and bite at the cuticle in feeding.

I did not time this struggle but it must have continued twenty minutes or more and at its conclusion the *Prosoplus* larva was completely immovable and did not struggle at all when she fed in the usual manner of her kind.

Conflict of Sclerodermus chilonellae with its Prey. This species is much larger and stronger than *S. immigrans* and attacks the vigorous woodboring larva of *Hyposmocoma chilonella*. Three females were bred from cocoons brought in from rotten wood of *Pipturus* in which were many larvae of this moth. A larva was placed with these three females and a male on July 7, and on July 10, the larva was seen to be paralyzed and was completely sucked dry. Another larva placed with them on the same day was paralyzed on July 12, and completely sucked dry by July 14.

One female and the male were separated and placed with a large *Hyposmocoma chilonella* larva, by which the male was soon killed. . The other two were placed with another *Hyposmocoma* larva about 20 mm. long and they proceeded to attack it jointly, their bodies straight and backing up to sting. They were exceedingly active on their feet, dodging the attacks of the *Hyposmocoma*, the latter being very aggressive in its efforts to bite the end of the abdomen of the

Sclerodermus. It seems to be the purpose of the *Sclerodermus* to provoke the attack, for when this takes place it dodges and strikes with its sting and the larva sometimes seems to have succeeded in getting hold of the abdomen, but it did not in this case and soon after it became quiescent and the *Sclerodermus* females were seen feeding over the surface, nipping the cuticle to suck its juice.

After a half hour or so the *Hyposmocoma* larva which had been isolated not being attacked and having walled itself away from the *Sclerodermus,* they were both placed in the tube with the other larva and the two females. Here it was very restless and began creating a disturbance, for it was larger and more powerful than the other larva. The *Sclerodermus* female which had been moved with it began to make tentative approaches and examinations, and after she had learned her way about among the bits of rotten wood in the tube, she began to be more definite in her examinations, examining it with her antennae when she encountered it and then began to back up to it and to attack backward. Some of these attacks were made at the anal extremity and a few at the side, but after a while it succeeded in arousing the attack of the larva and the fencing between the two was fast and furious, now one seeming to have the advantage and now the other. The *Sclerodermus* was once seen with its sting inserted at the upper base of the mandible but the direction of the attack was toward the throat. After perhaps a minute of this conflict the combatants separated and the *Sclerodermus* retired to a sheltered place. The *Hyposmocoma* larva seemed partially stupefied and ceased to move around so actively. After fifteen or twenty minutes it began to move about again but less vigorously and the attack was renewed, generally directed against the head but occasionally pressed against the sides of the thoracic segment. This time the conflict was noticeably shorter and at its end the larva retired a little while the *Sclerodermus* held its ground. By this time the larva had begun to be noticeably paler, an indication of

the increasing paralyzation. They came to rest with the abdomen directed toward the head of the larva and not quite touching it. From time to time the larva seemed to relax so as to touch the *Sclerodermus* which would stir slightly but without trying to sting, but the larva would jerk back each time.

After about ten minutes of this, there was a moment of fencing again, only two or three movements of the larva and corresponding stinging movements of the *Sclerodermus* but apparently no actual stinging and the conditions were resumed. After about three minutes the caterpillar's head sank down but very soon the conflict was renewed, the *Sclerodermus* attacking along almost the entire length of the larva, which was aggressive and changed its position entirely. After this conflict the *Sclerodermus* retired to shelter again some distance away.

Definite efforts were apparently made in this conflict to sting on the side of the anal extremity and the side of the thorax as well as at the head.

After this conflict both insects remained quiescent for some time but after about 20 minutes, the caterpillar began to move slowly and in about half an hour it was able to move about rather freely but more feebly. In the meantime the *Sclerodermus* female had joined the others, doubtless more or less confused by the presence of the quiet larva paralyzed by the other two females.

Oviposition. The females have not been observed to oviposit in any case short of seven days after emergence, giving them ample time for emergence, consumption of the cocoon, dispersal, finding the prey, mastering the prey, feeding upon it and a resting period afterward.

Careful observation shows that the female does not prepare a place for oviposition by piercing the skin of the prey with her mandibles or sting. In oviposition the body is curved transversely around the body of the larva. The sting and sheaths are extended and the hypopygium was widely sepa-

rated from them. She holds herself for some time immobile except for one hind leg and the ovipositor and sheath which move slightly from time to time, finally the egg glides slowly out under the sheaths and sting. After the discharge of the egg, she leaves at once without examining the egg.

The process of oviposition occupies two or three days ordinarily, and this is followed by some days interval before the next lot are ready. The eggs being large in proportion to the size of the insect a gravid female has her abdomen considerably distended just before oviposition.

The number of eggs laid upon a particular grub seemed in most cases to show some relation to its size, but this may be due to the female eating some of her own eggs, for this has been observed in numerous cases where the beetle larvae had become so dry as to be unsuitable for her food. The number of eggs laid in a single batch seems to run from about ten to nearly forty and a single female may lay from four to six or more batches of eggs with intervals of five to seven or more days between; my observations do not enable me to state with any accuracy the number of eggs laid by a single female nor her usual length of life, but probably not many females lay more than 150 eggs nor live more than three months.

General Habits. The females are exceedingly hardy in their natural environment and work their way readily through the bark, rotten wood, and debris produced by other insects, using their stout mandibles to gnaw their way about if necessary. In my earlier work with them several were lost by their eating their way through corks in vials in which they had been confined. They are not readily killed by cyanide of potassium and frequently revive after having apparently been killed and mounted on points. The alate females do not readily employ their wings in flight but will do so on occasion, especially in the sunshine. The males are much less hardy than the females and are usually dead by the time the females begin oviposition. In several cases where a male was

left with a female and her quiescent prey, it has been found decapitated and the females were jealous of the feeding of the male on the grub, as the egg laying time approaches driving it away.

The Prey of Sclerodermus immigrans. As has been already indicated, the adult females show remarkable versatility in their attacks upon possible prey and great catholicity in their choice. It was only in the case of *S. immigrans* that I was able to carry on any extended series of breedings but the few experiments which I was able to carry on with the endemic species gave no indication of any difference in this regard. I was unable to determine that this *Sclerodermus* would reject any Coleopterous larva whatever, and I have succeeded in breeding it from *Caryoborus gonagra* (Fabricius) (Bruchidae); *Sinoxylon conigerum* Gerstaecker, *Schistoceros cornutus* (Pallas) (Bostrychidae); several species of endemic Anobiidae; *Tenebroides mauritanicus* or a related species (Temnochilidae); *Tribolium ferrugineum* (Fabricius), *Gnathocerus cornutus* (Fabricius) (Tenebrionidae); *Lagocheirus obsoletus* Thomson, *Coptops aedificator* (Fabricius), *Xystrocera globosa* (Oliver), and *Neoclytarlus cuphorbiae* Bridwell (Cerambycidae). In the case of the few Elaterid larvae which happened to be available furious attacks were made but the larvae were able to escape by forcing their way through the cotton plug with which the tubes containing them were closed, dislodging the *Sclerodermus* on the way. Several Rhyncophorous grubs were used but as it happened all died before the *Sclerodermus* larvae finished feeding. In general this was the case with the wood-boring and other Lepidopterous larvae used, the lowland climate being exceedingly likely to induce moulds and other troubles with these inhabitants of the cooler climate of the mountains. The Hymenoptera utilized have been already indicated. Perhaps the most surprising host upon which this *Sclerodermus* was bred was the termite, *Calotermes cautaneus* (Burmeister). In this species the mud-like anal discharge occasionally killed

the *Sclerodermus*, but usually they were able to master the ordinary forms of workers and nymphs and the dealated adults, but in every case the soldiers were able to kill their assailants. Several hundred *Sclerodermi* in all were bred from this host.

The only possible prey rejected by this species which were offered were paralyzed crab-spiders from the nests of *Sceliphron*, a mealy bug of the genus *Pseudococcus*, and the larvae of a species of flesh fly, *Sarcophaga*. The refusal of the mealy bugs and spiders was absolute, the *Sclerodermi* placed with them dying of starvation. The behavior with the *Sarcophaga* larvae and the puparia into which some of them transformed was interesting and the *Sclerodermi* showed marked differences in their actions towards the puparia. A lot of *Sarcophaga* larvae were squeezed from the mother fly and placed upon cooked meat, Oct. 8, 1919, and this moistened with water the next day. On Oct. 10 they were removed from the decayed meat, placed in coral sand to absorb as much of the juices as possible, washed in clean water and dried on blotting paper and placed separately in tubes plugged with absorbent cotton and a female *Scleroderms immigrans* placed with each. In almost every case the *Scleroderms* removed to the farthest point in the tube and remained there. In several cases, however, the maggot in its wanderings crowded near the *Scleroderms* and in these she attacked the larva with her sting from the cotton but did not take hold with mandibles and feet. On Oct. 11, out of forty-nine *Sclerodermi* placed with *Sarcophaga* larvae thirteen were dead and out of the thirty-six surviving but one was found close to the maggot. The deaths of the thirteen *Sclerodermi* were in most cases probably due to starvation. Some, however, were dead on account of the foul discharges of the larvae, *per anu*, which had covered the *Sclerodermi*, and it may be that this was the principal cause of death in the others as well. All the maggots had passed such discharges but it was in some cases dried about the anus of the maggot and had not greatly contaminated the tubes. The maggots were removed

and placed with the *Sclerodermus* in clean, fresh tubes. By Oct. 13 twenty of the fifty maggots had pupated and the remaining larvae were more or less collapsed and dried up without any positive indication of their having been fed upon by the *Sclerodermus*. When some of the puparia were opened up the *Sclerodermus* female at once attacked them and fed upon the pupa freely and in one instance a *Sclerodermus* was seen gnawing away around the anal pit of the *Sarcophaga* puparium in the effort to enter.

The kinds of prey actually known to be utilized in the field are the Bruchid, the two Bostrychids, and the Cerambycid larvae excepting the *Xystrocera*. It is evident that several things tend to limit them in actual practise: (1) The adult *Sclerodermi* like to frequent dead and seasoning or rotten wood and practically confine their visits there. The pods of *Acacia farnesiana* in which *Caryoborus* was found attacked is only an apparent exception. In its properties it is near enough like the wood and is found attached to the bushes. (2) Otherwise available prey may be able to destroy the females. (3) Some of the prey may not keep in condition for larval food long enough for them to reach full growth. (4) The termites and ants would not usually be attacked because entrance to the nests would be successfully resisted.

Prey of the Endemic Species. The endemic species of *Sclerodermus* have until 1919 always been found in association with wood-boring larvae of moths related to *Hyposmocoma*, *Scaenoprepia*, and *Hyperdasys*, but in August, 1919, Mr. Swezey secured material of *S. muiri* Bridwell from Kona, Hawaii, above Kealakekua in wood of *Straussia*, where it was taken from the borings of an Anobiid beetle upon the larvae of which they had evidently bred. The material consisted of two masses of cocoons of three and five from which three and four apterous females emerged respectively. Repeated examination of material in the mountains near Honolulu has disclosed but little indication of use by any of the endemic species of Coleopterous larvae but *S. poecilodes* Perkins was

occasionally found under circumstances indicating the occasional use of Rhynchophorous larvae.*

However, by the use of the larvae of *Neoclytarlus euphorbiae* it was found possible to breed the endemic mountain species in the warmer climate of the lowlands in Honolulu. In this way I have been able to breed considerable numbers of *S. chilonellae* Bridwell, *S. polynesialis* Saunders, and *S. poecilodes* Perkins.** Only inadequate material of *S. tantalus* Bridwell and *S. kaalae* were obtained.

Development. The eggs hatch in three or four days, the larvae feed for about five days and the prepupal period, including cocooning, the prepupal period and chitinization of the adults, require about fourteen or fifteen days, so that the entire development from egg to adult requires from twenty-two to twenty-four days. This with seven days for the development of the eggs gives approximately thirty days from egg to egg.

The earlier stages of the larvae feed upon the surface of the prey and then on reaching their full size the larvae gnaw their way through the larval skin of the host and push their heads and part of their body into the interior of the larva for their final feeding, much as recorded by Dr. F. X. Williams for *Epyris extraneus*.

The instars of the larvae were not worked out in detail, but an interesting development of the larval mandible was observed, that of the first instar larvae being apparently simple while the last instar has it pectinate with about eight long teeth, the number of teeth increasing with the moults.

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*In January, 1920, the writer found abundant material of *S. polynesialis* Saunders attacking both moth larvae and *Clytarlus indecens* larvae in the stems of *Smilax* on Mt. Kaala in the Waianae Mts. of Oahu. A large proportion of the females were alate, the first alate females found in any of the endemic species.

**This interesting line of work was cut short by the writer's taking up anew his studies of the Bruchidae. It is to be hoped that further studies of these endemic forms may be taken up and the comparative biology worked out.

The cocoons require about two days for construction and are built in a fairly compact mass in the vicinity of the prey upon which the larvae have fed. This has ordinarily been almost completely consumed by the larvae and their mother.

As has been previously recorded, the mother feeds with the larvae and on occasions when the prey deteriorates before the larvae are full-grown she may resort to cannibalism, feeding upon her eggs or larvae. In one instance two larvae were found feeding upon one of their own kind which had perished on account of the deterioration of their food.

The female does not pierce the skin of her prey with her mandibles but apparently forces the juices out through the cuticle with her mandibles. She later feeds upon the juices exuding from the wounds made by the larvae. I have not been able to discover any certain evidence of any kind of maternal assistance to the larvae.

12. Scleroderms Immigrans, an Immigrant from the Philippine Islands.

This species was taken originally from the cocoons of the Bruchid, *Caryborus gonagra*, in the pods of *Acacia farnesiana* on the island of Oahu. In describing the species it was said to be in all probability an immigrant into the Hawaiian Islands. This belief has been confirmed since a female collected by Dr. F. X. Williams at Los Banos, Luzon, Philippine Islands, now in the collection of the Hawaiian Sugar Planters' Association proves to belong to this species. Dr. Williams informs me that the species is not uncommon there and is semidomestic, being associated with Bostrychid beetle larvae in the houses.

13. Notes on the Biology of a Cephalonomia.

Several small Scolytidae of the genus *Hypothenemus* and its allies have been described from the Hawaiian Islands, are numerous in individuals but at present we have but little detailed information regarding their habits and they

have never been tabulated. Some of the species are twig borers, the adults mining in the drying twigs of various plants. The adults are commonly associated in small colonies; whether these are the descendants of one stem mother which had founded the colony, or whether on account of their abundance, several are associated in working the suitable twigs, I cannot say. The entrances to their mines are usually at the nodes of the twigs or they may start at the ends or from the ends of the burrows of *Sinoxylon conigerum* or *Schistoceros cornutus*. From the entrance tunnels usually run in both directions, either just under the bark or in the pith, or if associated with the Bostrychid beetles, they may follow the larval tunnels of the latter. In any case the mother beetle, when she has excavated her tunnel to suit her taste, lays five or six eggs very large in proportion to her size. The larvae which hatch from these appear to live upon wood which they excavate for themselves, or possibly they are assisted in this by the adults. These larvae are of the common form of beetle grubs in the group but are very small and feeble.

Dr. Perkins records in the Fauna Hawaiiensis a *Cephalonomia* attacking these. I am uncertain whether the species referred to is the one whose habits are discussed here, or a brownish one found by Mr. Swezey associated with a species of *Hypothenemus* living in the stems of Bermuda grass.

I have never been able to locate living material of any such species in desultory examination, but on May 30, 1919, I swept a small black *Cephalonomia* in the Waikiki marshes which belonged to a species unrepresented in the collections here. Again on examining some twigs of *Euphorbia multiformis* infested by three or more species of *Hypothenemus* (s. l.) which had been brought in from Ewa Coral Plain on June 8 and 10, 1919, four females were discovered, three of them associated with small white cocoons in the *Hypothenemus* tunnels. I determined to attempt breeding them artificially.

In order to have control of my material I cut into twigs

until I found burrows containing larvae. These were then transferred with a brush into *Hypothenemus* burrows in a short bit of a twig and this placed in short sections of glass tube and this plugged up with cotton after placing a female *Cephalonomia* with them. This is not such a simple matter, since the female is only a millimeter long and the *Hypothenemus* is shorter though very much stouter.

One of the females was unfortunately injured and was mounted for preservation. Three females remained for breeding purposes.

After three or four days one of the twigs was opened and two larvae were found bearing each a single egg on the venter, and in about two weeks, from these a female bred out. This female was so treated for five successive times and each examination revealed larvae of *Hypothenemus* bearing one, two or three eggs or larvae, according to circumstances, and a fair share of these reached full growth and cocooned. The other two females were less fruitful and only a single pupa bearing a larva of the *Cephalonomia* on the dorsum of its abdomen was obtained. One of them died without any egg laying.

These trials revealed certain interesting facts: The egg laying is slow; the females can live for considerable time with only their host insects for food; usually adult *Hypothenemus* present in the twigs were dead or if living had lost their power of locomotion, the only signs of life being a slight twitching movement of the legs. Further observation showed that when pressed for food the *Cephalonomia* will feed upon the *Hypothenemus* pupa and adult as well as sucking the juices of the larva.

Having gone so far in the study of these species, I became desirous of seeing how the minute *Cephalonomia* goes to work in attacking its victims. I had found them not disposed to work upon the larvae outside of the tunnels in the wood and they did not easily become interested in larger *Xyleborus* larvae in williwili wood.

At length it occurred to me that they might work under

observation if placed in fine glass tubes with their prey. So fine glass tubes were drawn out from the glass tubing of about one-fourth inch which had been used to contain the twigs and larvae placed with these, the larger ends serving as entrance chambers. These tubes were a little larger than the *Hypothenemus* tunnels. Larvae placed in these tubes with the *Cephalonomia* alone interested her, but she seemed disturbed. On adding the fine debris from the *Hypothnemus* tunnels conditions were more nearly normal and I was able to observe her at work making her way slowly through the debris. When she encountered a larva she would examine it for a moment, then proceed to sting it in the head without much of an effort and pass on with little consideration for her victim and no evidence of any fear of injury from its mandibles. When a pupa was encountered, the apex of the abdomen was the part attacked. In this way in a very few moments all the larvae and a pupa were attacked and quieted. By the next morning all the larvae and pupae (six in all) were paralyzed, but no eggs had been yet laid on the second day.

My observations upon this species were unfortunately cut short owing to my preoccupation with the *Sclerodermus*. It was found possible in this way to breed the species but the time required to find the minute larvae necessary for breeding the species made is possible to do only desultory work on this species. Newly hatched *Neoclytarlus* larvae, small *Sinoxylon* larvae and *Proterhinus* larvae and pupae were however utilized by the adults for food and eggs laid upon them. The larvae of a Scolytid breeding in wiliwili wood (*Erythrina monosperma*) supposed to belong to *Xyleborus* were somewhat slimy upon the surface and were at first rejected, but later upon being forced to it by necessity were utilized for both feeding and breeding purposes.

This colony at length died out through neglect after about twenty adults had been bred and the species has not since been encountered.

It is evident from the notes above that *Cephalonomia* re-

sembles *Sclerodermus* in its biology, as might be expected from its relationship to that genus.

So far as we have knowledge of the habits of the Bethylidae we may group them in three groups:

(1) The *Epyris* group, in which the adult is markedly fossorial in habits, feeds on sweets as well as upon the juices of the prey, and lays but a single egg per host. The habits of *Epyris extraneus* Bridwell have been worked out by Dr. F. X. Williams, the writer has observed fossorial habits in a South African species, and Williams and the author have observed *Holepyris hawaiiensis*, and Silvestri, an Italian species of this genus.

(2) The *Goniozus* group, in which the adult attacks concealed Lepidopterous larvae and lays several eggs upon them without moving them. These species require saccharine food. Several species of *Goniozus*, *Perisierola* and *Sierola* are known to attack in this manner. *Laelius* also apparently belongs with these.

(3) The *Sclerodermus* group, in which the adults feed exclusively upon the juices of their prey which they attack in hiding and do not move, and several eggs may be laid upon the prey.

14. A New Genus and Species of Bethylidae from the Hawaiian Islands.

Nesepyris new genus.

Head parallel sided, elongate oblong, greatly prolonged behind the eyes; eyes slightly hairy, ovate; mandibles nearly straight, crossed in repose, bidentate within before the acute apical tooth; antennae 13-jointed; ocelli in an acute triangle.

Pronotum not margined nor furrowed, as long as the mesonotum and scutellum together; mesonotum transverse, lateral furrows abbreviated in front, parapsidal furrows percurrent; scutellum with oblique lateral fossae at base connected by a shallower impressed line; propodeum margined laterally and behind, with an imperfect median raised line; calcaria 1-1-2; ungues simple; posterior tibiae with a few denticles outwardly; wings with closed costal, median and submedian cells; nervulus interstitial with the basal; stigma very short and poorly

developed; metacarpus absent; radius as long as the median, not nearly attaining the wing margin or apex; wings ciliate.

Related to *Allobethylus* but the submedian cell is closed. In Kieffer's tables runs to *Epyris* but the eyes are hairy, the stigma is less developed, the fossae of the scutellum are different, and the propodeum has only a single imperfect median longitudinal ridge.

Type: *Nesepyris ewa* Bridwell.

Nesepyris ewa n. sp.

Length about 3 mm.; length of wing, 2 mm.

Black; mandibles, antennae, tibiae and tarsi yellowish-testaceous; wings hyaline, the venation yellowish.

Clypeus carinate, truncate and thickened at apex; eyes one and one-half times their length distant from the occipital margin, malar space transverse; front with a short impressed line leading up from the clypeal carina; ocelli in an acute triangle, the anterior ocellus five times as far from the eye-margin as from the posterior ocelli, these nearer to each other than to the occiput. Head strongly arched transversely, coarsely tessellate, with short evenly disposed whitish hairs; eyes rather coarsely facetted, with some short scattered hairs; antennae with the scape about half as long as the pedicel, pedicel longer than broad, as long as joints 1 and 2 of the flagellum, these and the rest except the last broader than long.

Pronotum coarsely tessellate, with short evenly disposed whitish hairs, longer than the mesonotum and scutellum together, narrowed about one-half anteriorly; mesonotum with the parapsidal furrows converging posteriorly, ending opposite the oblique fossae at the base of the scutellum, lateral furrows about half as long, minute sculpture more transverse anteriorly, pubescence on the middle lobe like that of the pronotum; surface of the mesopleura similar to that of the pronotum, with a simple rounded fossa; scutellum with the oblique fossae connected by a shallow transverse furrow; propodeum shining, longer than the mesonotum and scutellum together, the sides subparallel, the superior face with the surface punctato-reticulate at base, the apical middle highly polished and shining with the surface malleate, some oblique striae laterally, the sides and declivity highly polished and shining, tessellate with the dividing lines not impressed.

Abdomen ovate lanceolate, depressed; tergites highly polished and shining, tessellate, margins of 3-5 triarcuately depressed as in *Scleroderma*.

Described from two female specimens from the Ewa Coral Plain, Oahu, June 8 and August, 1919 (Bridwell). Type in the collection of the Hawaiian Entomological Society, paratype in the author's collection.

Experiments made with the paratype female indicate that

the species is predaceous upon small lepidopterous larvae, probably those feeding about dead wood.

It is uncertain whether this species is endemic or introduced. The region where it was found is near sea level but harbors many endemic insects because the aridity prevents the spread there of the ant, *Pheidole megacephala,* which destroys most endemic insects where it occurs.

15. Holepyris hawaiiensis (Ashmead) and its Prey.

This species is far more common than its congener *H. hospes* Perkins, being very commonly found about houses and in places where stored food and feeds are kept. Many desultory attempts have been made to breed it by the writer, but without any definite results indicating the nature of its prey. Some observations by Dr. F. X. Williams paralleling those here recorded revealed the fact that it attacks lepidopterous larvae in a fashion quite as characteristic of the *Fossores* as the work of *Epyris extraneus* observed by him.

Neither he nor I have succeeded in breeding the species through from egg to adult, though we have secured oviposition in numerous instances. The lepidopterous larvae worked with by me have been *Ereunetis flavistriata* Walsingham, *Plodia interpunctella* Huebner, and *Corcyra cephalonica* (Stainton) (all determined by Mr. Swezey).

The female lays but a single egg upon a caterpillar, as recorded by Silvestri of one of the Italian species.

An adult taken shortly before noon on Sept. 13, 1919, was placed in a tube and a sugar cane budworm added. At about 3:45 it was attacked and stung in the mouth and then attacked in the head region by the wasp using her mandibles, first at the left antennae and around the labium. By the struggles of the *Holepyris* the larva was turned over and seized by the left leg at the apex of the basal joint. Here she fed for seven minutes. After a time she seized the still fairly active larva, by the labium apparently, and dragged it slowly resisting as much as possible but not very actively, the whole

length of the tube, where she left it for some time. In order to see it while she was seeking a place to hide her prey, I joined two tubes with the original, each successively smaller. She then reversed the larva and dragged it in the same manner as before to the middle of the middle-sized tube, where she left it and retreated part way to the original tube while she rested near by. When she touched it the larva returned toward the smallest of the tubes, leaving her resting. After a few minutes she attacked the larva, now at the mouth of the smallest tube, and attempted to drag it first in one direction then in another, always holding on by her mandibles to the labium of the larva. For a half hour nearly she continued the struggle when she appeared to sting the larva again at the throat and came to rest on the larva longitudinally in front with her head toward the rear of the larva. Ten minutes later the larva escaped from her at the mouth of the smallest tube and retired to the farther end of the largest tube and then returned to the middle, where she found it,, and holding on by its left antenna was dragged by the larva to the middle of the smallest tube, where the larva stopped, though the *Holepyris* attempted to pull it farther, this time by the left antenna. Failing this, she walked slowly along the full length of the larva and back, the larva giving a little jerk at either extremity, then she advanced in front of the larva to the end of the tube, then soon returned and was able to bring it along to the extreme end, but soon it jerked back a little when she walked to its full length again.

All these things took about an hour and at 5 p. m. the observations were suspended.

At 4 p. m. Sept. 15, one egg had been laid, placed longitudinally on the dorsum of the ninth abdominal segment.

By Sept. 18, no other eggs laid on a new larva placed with her. The egg previously laid had dried up. The larva with the female had shrivelled up from her feeding. Placed with two fresh larva in a tube she attacked both, stinging them, and fed upon the leg of one of them, this time the base of the

middle right leg. Afterward she began dragging it about by the mouth as before. Having occasion to transfer her to another tube, I attempted to shake the contents of the tube into another. Severe shaking failed to dislodge her from the larva and the larva being held in the tube by a silken thread, a needle was inserted into the tube and the thread caught upon it and the *Holcpyris* and her prey were transferred from the one tube to the other without her losing her hold. The larva during this time was far from being completely paralyzed, only the mouth parts seeming to be incapable of motion. Sometimes she was able to get the larva to move itself in the desired direction, at others it was able to resist her utmost efforts to drag it as she wished.

On Sept. 22, the female had placed one of the two larvae in the narrowed portion of the tube and one egg had been laid, this time on the glass, opposite the dorsal posterior part of the larva. The other larva had been sucked nearly dry. On being placed with fresh larvae, she attacked as before and stung the larva at the throat. She was observed feeding near the anal extremity. Afterward she dragged the larva about as before.

She died soon after without laying further eggs.

This species was common during Dec., 1919, in the warehouses of the Union Feed Company in Kakaako. About two dozen were taken on December 10 to 12 and placed three or four together in test tubes with some larvae of the moths found in stored products there. It was not long until some of them pounced upon the larvae and after a struggle began leading them about as had previously been observed. The wasps did not appear to molest each other, though one passing another at work would seem interested in what it was doing. On the other hand the presence of several larvae in the same part of the tube seemed to cause some confusion on the part of the wasp at work, for sometimes after leaving her prey for an instant she would mistake another larva for the one she had been attacking.

The adult females work diligently manipulating the larvae for food, but they are not able thus to feed themselves as the *Sclerodermi* can, but require other food. It has been necessary for me in working with them to feed them with honey in order to keep them alive.

Two males of this species were taken on my office windows and one of these placed with a very large female soon mated with her and mating was repeated several times.

16. Distinction between Holepyris hawaiiensis and H. hospes.

There has always been some difficulty on my part in distinguishing between these species from the descriptions. I have therefore drawn up a summary of the characters by which the females may be distinguished.

I have never seen a male of *H. hospes*.

Holepyris hawaiiensis (Ashmead). Smaller; antennae dusky at tip; punctures of head finer; submedian ridges of propodeum nearer the median, more distinct and shorter; the area lateral to them more finely striate anteriorly and more coarsely posteriorly.

Holypyris hospes Perkins. Larger; antennae not dusky at tip; punctures of head larger and more distinct; submedian ridges of propodeum farther from the median, less distinct; lateral areas more evenly and finely striate.

A New Lowland Plagithmysine Cerambycid from Oahu with Notes on Its Habits (Coleoptera).

BY JOHN COLBURN BRIDWELL.

The insect fauna of the lowlands of the Hawaiian Islands is now made up largely of immigrant forms brought in through the operations of commerce. With the advent of the European and Asiatic races in the islands and the introduction of the cultivated plants and weeds and the development of herds of cattle the native vegetation began to disappear from the lowlands, surviving only on some of the

dry ends of the lower spurs of the mountains, in the sides of the gulches, in the marshes, along the sea shore and in some of the more arid regions where the lack of surface water checked the wanderings of the cattle.

The endemic insects, being as a rule but little adaptable to new host plants, receded with the plants to which they were attached.

With the spread of cultivation and the introduction of hundreds of species of plants for economic purposes or for ornamental plantings for many years entirely without any system of port examination and quarantine, many insects attached to these plants were introduced and became established. Some of these entered into direct competition with endemic lowland insects. Other insects, however, which were parasitic and predaceous upon the introduced insects soon adapted themselves to attack the endemic lowland insects and reduced their numbers. Among these one species is doubtless more important than all the rest. The ant, *Pheidole megacephala*, is eminently predaceous in its habits, attacking other insects indiscriminately and wherever it has spread the endemic insect fauna has practically disappeared, only a few Hymenoptera, such as species of *Crabro, Odynerus* and *Nesoprosopis*, some Coccidae, Jassidae, and Delphacidae among the Homoptera, some Heteroptera, some Lepidoptera and possibly some Diptera have been able to survive where this ant is able to maintain itself in its full numbers. But none of the characteristic groups of endemic Coleoptera are able to persist where it is found since they are generally sluggish, of feeble powers of flight, and defenseless against the attacks of the myriads of ants present in the cultivated area of the islands.

It has been generally recognized that the cooler and generally damper climate of the mountains forms an impassable barrier to the spread of *Pheidole*, but it is not so well known that there are certain of the dryer areas of the lowlands in which it is unable to maintain itself. Since these

regions are also the ones upon which the native lowland vegetation has persisted it is natural that the native insects should survive here, if at all.

On the Island of Oahu, these arid regions are found at the extreme southeastern end in the vicinity of Makapuu point, and again on the western side of the island from Kaena point along the Waianae coast to Barber's point, and thence eastward to near the Pearl River Inlet. In general these regions are difficult of access, without good roads and without water, so as to make camping difficult, and the surface is irregular and difficult of passage for pedestrians, owing to the growth of the glue (*Acacia farnesiana*) and algaroba (*Prosopis juliflora*) which cover their surface. The native vegetation is scattered and as a rule there is but little to repay the insect collector for his trouble in working there. Such conditions have led to a very general neglect by entomologists of these regions and they have been but little investigated excepting the Waianae coast and the vicinity of Koko Head.

In 1916, Mr. C. N. Forbes, the botanist of the Bishop Museum, called my attention to the region to the south of Ewa Mill and Sisal as a region where some of the endemic lowland plants have survived, and in November of that year the writer accompanied him on a collecting trip there.

He was rewarded by finding there an undescribed Jassid of the genus *Nesophrosyne* attached to a form of *Euphorbia multiformis* growing there, and rediscovered the endemic *Plutella albovenosa* Walsingham, discovering the feeding habits of its larva. It is attached to the endemic caper, *Capparis sandwichiana*, the young larva mining under the cuticle of the green fruits, while the older larva burrows in its fleshy walls, emerging to spin a characteristic *Plutella* cocoon.

In 1918 Mr. O. H. Swezey and Mr. P. H. Timberlake visited the same region, finding there the Conoiopterygid, *Coniocampsa vesiculigera*, which has rarely been taken. The writer again visited the region on June 8 and 10, 1919, finding a new Plagithmysine Cerambycid, described on a later page

as *Neoclytarlus euphorbiae* and *Proterhinus deceptor* Perkins which had previously been taken by Mr. Timberlake on Diamond Head. Both belong to particularly characteristic endemic Hawaiian groups of beetles and are the first species of these groups to be discovered on the lowlands. Material was brought in from which a second endemic species of *Plutella* attached to *Capparis sandwichiana* described elsewhere in these Proceedings as *P. capparidis* by Mr. Swezey, and a new Bethylid representing a new genus, described in another paper as *Nesepyris ewa*.

On June 30, 1919, Mr. O. H. Swezey, Mr. E. H. Bryan, Jr., and the writer visited the same general region, going by train to Gilbert and walking by one road to the lighthouse at Barber's Point, returning by another route to Gilbert, finding some endemic Delphacids, a Jassid attached to *Myoporum* and an *Oliarus* which had previously been taken by Mr. Swezey at Ewa Mill and the only lowland species of the genus known from these islands. Here also was taken a second species of *Proterhinus* (*P. excrucians* Perkins).

The writer visited the region near Sisal again on July 6, 1919, and many times subsequently during 1919.

These are apparently the only entomological investigations which have been made in this region, which for the want of any comprehensive name the writer has called the Ewa Coral Plain. The results of these visits have been so interesting and since the region promises to furnish further members of the old lowland fauna, it is worth while to discuss the conditions there somewhat fully.

The Ewa Coral Plain is made up of an old coral reef which extends from the Pearl Harbor Lochs and the inlet connecting them with the sea to Barber's Point for a distance of about eight miles, extending inward from the sea for a mile and a half to two miles. Nearly parallel to the southern shore and about a mile from it, extends an old solid barrier reef in which are the characteristic pits such

as are found in the fringing reefs at Kewalo and Waikiki, and generally where coral reefs lie near the surface. These pits are of varying sizes. They may be only a foot or so wide, even fifteen feet in depth and in the larger ones there are traces of the bread-fruit, the paper mulberry, the ti, yams, noni, native sugarcane, and other plants such as *Ipomoea tuberculata* and *Cassia Gaudichaudii*, which may have been under cultivation.

From the first old reef, which seems to lie near where the contour of 40 feet is located on the topographical map, the surface slopes gradually down to the sea, successive reef formations may be noted. On some portions of the plain, particularly toward the east, the surface has sufficient soil for the cultivation of sugar-cane, and in other places sisal has been planted, but west from Ewa Mill and from about a half mile south of the Oahu Railway and Land Company's tracks to the sea, the surface is covered with a growth of glue, algaroba and scrubby lantana, in places quite dense, but generally a straggling growth on account of the scanty rainfall. This region is utilized to some extent as rough pasture for cattle and many colonies of bees are maintained where the algaroba trees are denser and larger.

Among the growth of algaroba and glue are the scanty remnants of the lowland flora which furnish a refuge for a remnant of the old lowland fauna of insects. Among these are a variety of *Myoporum Sandvicense*, *Erythrina monosperma*, sandal wood, *Acryanthes splendens*, *Capparis Sandwichiana*, *Portulaca villosa*, *Sida*, and perhaps most important from the entomological point of view, is the *Euphorbia*, which Mr. Forbes considers a variety of *E. multiformis*. It is to this plant which *Neoclytarlus euphorbiae* and some other lowland endemic insects are attached.

This *Euphorbia* is a low, freely branching shrub which has a short trunk, rarely more than an inch in diameter, which rapidly disappears into a multitude of branches and twigs,

the whole plant rarely reaching a height of more than two and a half or three feet.

This plant, like others in the locality, has considerable powers for resistance to drought, for here many months may pass between rains. Under such circumstances, the *Euphorbia* may lose its leaves and remain leafless. Branches broken down but not entirely separated from the parent plant may have their wounds closed with the copious milky juice and callous over without dying.

Neoclytarlus apparently does not attack the living plant but only the freshly dead stems before they are too much weathered. It is probable that the conditions prevailing in this region furnish this insect more material to breed in than ever was available before the natural conditions were changed. The season of 1919, having been abnormally dry led to the death of an unusually large number of the plants. Three things were observed killing the plants or putting their branches in condition for *Neoclytarlus* to breed in.

An armoured scale, as yet undetermined, occasionally becomes numerous enough at the base of the plant to kill it. Even if it does not kill the plant it may so weaken it that the immigrant Cerambycid, *Lagocheirus obsoletus* Thomson, may attack the weakened stems. This species frequently attacks the plant and completes its transformations after destroying the main stem and branches while the plant is living, the finer twigs being still green and flowing with the milky juice. The attack, however, ultimately results in the death of the plant and its utilization by the *Neoclytarlus*. Many plants unfavorably situated may be so weakened by drought as to fall victim to these beetles without previous injury by the scale insect. The presence of cattle on this area results in a great deal of mechanical injury through their trampling, many branches being broken off and the whole plant often broken down, yet putting many branches in condition for the *Neoclytarlus* to breed in. Whatever the cause of dying may be, the *Neoclytarlus* utilizes a plant quite thoroughly before it has time to

weather, so as to be no longer attractive to it. They utilize not only the larger branches and trunks but they may be found in the branchlets no more than an eighth of an inch in diameter. They feed first in the bark and sap wood and then make their final borings and pupal chambers deep in the wood where they close themselves in with the finely comminuted wood, as is not uncommon with Cerambycidae. Besides the *Lagocheirus* and the *Neoclytarlus*, the immigrant *Prosoplus hankii* (Fabricius) also attacks the *Euphorbiae* wood and competes with the *Neoclytarlus* for its food The finer branchlets, too small for them to use, are utilized by two or three small Scolytid beetles of the genus *Hypothenemus* or its allies.

The size of the beetles varies greatly, individuals breeding out from the main stem and branches being usually larger than those from the branchlets. Apparently they are also smaller where the wood fed upon has been dried than where it is moister.

The adults mate soon after emerging, within 24 hours, and oviposition begins at once. Mating is frequently repeated, the female ovipositing while accompanied by the male and very frequent mating takes place between the acts of oviposition. One female observed mated more frequently than she deposited eggs and was almost constantly surmounted by one of several males. She was very much averse to leaving the *Euphorbia* wood in proper condition placed with them and when not in copulation was constantly feeling about with the end of her abdomen in search of suitable crevices in which to oviposit. She was observed to oviposit in a patch of shredded wood formed by the larva of *Prosoplus* and on examination three eggs were found. These were fusiform, dull white, approximately .742 mm. long by 318 mm. wide, the end by which they were attached being a little more elongate than the other. The distal end is strongly reticulate, the rest smooth. Apparently the eggs are held in place by some slight cementing material.

In mating the male grasps the female with his front legs, which usually hold her near the middle legs, and walks when

necessary with the hind and middle legs. The tip of the abdomen is bent down in both sexes and after some manipulation the female straightens out the tip of the abdomen, extends the long hidden terminal segment and intromission follows. The male during intromission keeps in constant up and down motion on the hind legs as a pivot bending the head, prothorax, and tip of the abdomen. Separation appears to take place in response to movements of the long last segments of the female in search for suitable places for oviposition.

The combats between the males seemed very mild, males disputing possession of a female with the one in possession being fought away with the hind and middle legs and if persistent to some extent with the jaws. If the male had been in possession for some time, however, he seems often to give up the struggle readily. It was noticeable that at first in a tube containing a large male and several smaller ones and only a single female, the large male was able to keep possession for a considerable time but was finally replaced by smaller ones.

The adults paid no attention to honey placed with them for food. Mating and oviposition continued from early in the afternoon, when they were first placed under observation, until sundown at least, and indeed throughout the next day.

Eggs laid June 13 at about 2:30 p. m. were not hatched on June 16 but were found to have hatched by 10 a. m. June 18 and the young larvae found in the tube where they had been placed, escape from the egg having taken place through a slit in the proximal end. The first instar larva is legless, not unlike the older ones, and the middle of its body, its empty mid-gut constitutes a large airspace.

From eggs laid in the laboratory during July, adults were secured in 52 days, the indoor breeding indicating about two months as the usual time required for the development from egg to adult.

From the branches of *Euphorbia* brought in to breed out

the *Neoclytarlus* many individuals emerged of an immigrant *Hormiopterus* (Braconidae) described on another page as *H. rugrans*. This species attacks the larvae of the *Neoclytarlus* while feeding near the surface and the full grown larvae spin their cocoons in a mass in the borings of the beetle, emerging through a circular emergence hole. This species is generally distributed in the lowlands of Oahu.

From the material of *Euphorbia* attacked were found numerous examples of the immigrant Bethylid *Sclerodermus immigrans* Bridwell which furnished the material for the further studies upon this species published on another page of these Proceedings.

There was also found attached to this species a large species of *Eupelmus*, apparently endemic and undescribed.

Neoclytarlus euphorbiae readily oviposited and bred in the wood of the native species of *Euphorbia* so that a constant and dependable supply of larvae was obtained for use in the studies made of the biology of the species of *Sclerodermus*.

This species is the first characteristic species of the group called *Clytarlus* by Dr. Sharp in the Fauna Hawaiiensis of which the food plant is known which is not attached to one of the legumes, *Acacia koa* or *Sophora chrysophylla*.

The name *Clytarlus* will unfortunately have to be given up for this genus since none of this group were included under the name in the first paper (Trans. Ent. Soc Lond. 1878:206) in which it was employed, the only species there included being *Clytarlus robustus* Sharp=*Plagithmysus pulverulentus* Motschulsky, the type of the genus *Plagithmysus* and *cristatus* Sharp since referred by Dr. Sharp to *Callithmysus*. In order to avoid any further shifting of names, the former species may be designated as the type of *Clytarlus* Sharp 1878 and being thus isogenotypic with *Plagithmysus*, this genus must fall as a pure synonym. *Clytarlus* Sharp 1896 with *fragilis* as type thus is without a name and for it *Neoclytarlus* is suggested. Aurivilius in Coleop. Catal. 29:387, 1912, has merged all the Plagithmysine genera of Sharp into *Plagithmy-*

sus and with the discovery of additional connecting forms much can be said for this course. But whether we consider them as genera or subgenera the groups will still require names.

Neoclytarlus euphorbiae n. sp.

Allied to *N. fragilis* and *N. ultimus* but is less depressed in form and much darker in coloration.

Dull black; coxae base of tibiae, and femora, and frequently the base of the scape and a band beyond the middle of the hind tibiae, apical 6 or 7 antennal joints and base of others pale testaceous (the apical joints of the antennae more brownish); with rather whitish pubescence on the head, thorax, and abdomen, and on the clubs of the femora; on the elytra the pubescence is absent in two oblique irregular bands, one before the first, and one before the second third of their length, and the pubescence is much thinner near the apices of the elytra. Usually three transverse ridges on the pronotum, the anterior one not so near the margin as in *fragilis;* usually the pubescence is absent on the prominences of the sides of the upper surface of the pronotum forming an irregular longitudinal stripe there.

The apices of the elytra are obliquely truncate within and less rounded than in *fragilis.* Punctures of pronotum and elytra finer than in *fragilis.* Club of femora as in *fragilis,* elytra not particularly elevated near the scutellum.

Male antennae longer, the apical joints much longer than in the female, Last abdominal segment emarginate but less so than in *mediocris* as figured (Fauna Haw. 3: pl. 6 f. 16).

Length of type and allotype: 10 mm.; length of smallest specimens of either sex: 5 mm.

Described from a series of 97 females and 107 males bred from the wood of *Euphorbia multiformis* from Ewa Coral Plain, Oahu, at an elevation of about fifty feet above sea level, June to November, 1919 (Bridwell).

Type male, allotype female, and paratypes in the collection of the Hawaiian Entomological Society. Paratypes in the Bishop Museum, the collection of the Hawaiian Sugar Planters' Association and in the private collections of P. H. Timberlake and of the author.

NOTES AND EXHIBITIONS.

Cryptorhynchus mangiferae.—Mr. Swezey recorded obtaining the mango weevil from mango seeds received from Wai-

luku, Maui. This is the first record of this insect on Maui.

Plusia pterylota.—Mr. Swezey exhibited a specimen of this rare moth given him by Brother Matthias Newell who had caught it in Hilo. Brother Matthias stated that this moth had been described under the name *newelli*, by Dr. Perkins, from specimens which he had given him from Hawaii. In the Fauna Hawaiiensis, however, it appears under the name *pterylota*, from Oahu. It was not recorded in literature from Hawaii until later.

Bruchid in monkey-pod seeds.—Mr. Swezey exhibited four specimens of a Bruchid bred from a seed of the monkey-pod tree. The seed was taken from a pod picked up at the Waipio Substation June 10th. There was a hole in the pod and the seed was found to have several eggs on it. Recently these Bruchids have issued from the seed. The species appears to be new to the Islands.

Leafhoppers from Barber's Point.—Mr. Swezey recorded the capture of the following leafhoppers at Barber's Point near the sea coast on the Ewa Coral Plain, June 29th, 1919:

Aloha myoporicola, on *Myoporum sandwichensis*. (First record of this insect from Oahu.)

Nesophrosyne sp., this Jassid on the same host. (Previously collected only on Hawaii.)

Oliarus sp., on the same host. (Previously collected at Ewa Mill and in Manoa Valley.)

Hburnia leahi, on beach form of *Lipochaeta*.

Kelisia sporobolicola, on *Sporobolus virginicus* growing in marshes and sandy places.

Tasmanian insects.—Mr. Ehrhorn exhibited a collection of insects recently received from Tasmania. He also gave some account of a recent trip to California.

Kelisia eragrosticola.—Mr. Timberlake exhibited specimens of this *Kelisia*, of which he and Mr. Bridwell took a large series from *Eragrostis* on Kalihi Ridge at about 1000 ft. elevation, on June 15th. The species was described by Muir from

specimens found in Iao Valley, Maui, by Giffard and Fullaway. He also reported that he had found *K. swezeyi* on *Eragrostis* further up Kalihi Valley several years ago.

Nesocymus on *Eragrostis.*—Mr. Timberlake exhibited a Lygaeid collected on *Eragrostis* on Kalihi Ridge, June 15th. It is an apparently new species and belongs in *Nesocymus*. Mr. Bridwell had taken a single nymph on Manoa Ridge a few weeks previously, and reported that he had taken the species on *Sporobolus* at Barber's Point a few days later.

Pseudococcus saccharifolii.—Mr. Timberlake reported finding this mealy bug and its parasite, *Pseudococcobius terryi*, on the same day in Kalihi, likewise on *Eragrostis variabilis*, and that several more of the parasites were reared from material collected at that time. He also reported that Mr. Bridwell had collected a specimen of *terryi* recently on Manoa Ridge, and that neither the mealybug nor parasite had previously been taken except on sugar-cane.

Anagyrus from *Antonina indica.*—Mr. Timberlake exhibited specimens of a new *Anagyrus* recently reared from *Antonina indica* occurring on Bermuda grass collected at the corner of Lunalilo and Victoria Streets, Honolulu. One male was also reared the preceding January from the same host from Kaimuki. It is undoubtedly a new immigrant.

Eupelmus subseliger.—Mr. Timberlake exhibited a specimen of this Eupelmid, which was taken by sweeping lantana and weeds along the Bowman trail, Kalihi Valley, about 200-300 ft., on June 15th. The species appears to constitute a new genus and is apparently endemic, as a closely related species was found by Dr. Perkins at Kilauea, Hawaii.

Nesophrosyne on Euphorbia.—Mr. Bridwell reported finding the *Euphorbia Nesophrosyne* frequenting paluts without leaves on the Ewa Coral Plain.

Tramea lacerta.—Mr. Bridwell noted this species as common at the present time on Ewa Coral Plain, almost as common as the other species of immigrant dragonflies. It is very

abundant at Barber's Point near the coast. He commented on the general scarcity of this species previously.

Coniocompsa resiculigera.—Mr. Bridwell recorded collecting on the Ewa Coral Plain three or four specimens of this small Coniopterygid. The species was taken two or three times when first noticed a few years ago, and again last year at this locality by Mr. Swezey.

Cephalonomia sp.—Mr. Bridwell also recorded finding the small black *Cephalonomia*, reported at last meeting from the brackish marshes at Waikiki, in twigs of *Euphorbia* from the Ewa Coral Plain, and rearing the same from the larvae of *Hypothenemus* or related Scolytids. It was not known whether the species has been described or not.

Plutella capparidis.—Mr. Bridwell recorded finding a new species of *Plutella* feeding on the surface of *Capparis* leaves and doing a small amount of mining. It is distinct from *maculipennis* and *alborenosa* and Mr. Swezey has described it as *Plutella capparidis.**

Proterhinus on Sida.—Mr. Bridwell recorded finding specimens of a *Proterhinus* while sweeping Sida plants on the Ewa Coral Plain. It proves to be the same species taken by Mr. Timberlake on *Lipochaeta* on Diamond Head. (Later determined by Dr. Perkins as *P. deceptor*).

Proterhinus on Ipomoea.—Mr. Bridwell recorded collecting a species of *Proterhinus* from dead stems of *Ipomoea bonanox* on Tantalus, June 22nd. Five adult specimens and larvae were recovered. It seems to be the same species previously reared from *Clermontia*. (Later determined by Dr. Perkins as *P. restitus*).

New Cerambycid.—Mr. Bridwell exhibited specimens of a Cerambycid beetle belonging to the subfamily Lamiini, which appears to be new to the islands. It resembles *Prosoplus haukii* but has two carinae on the base of the elytra. The

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*See page 382 for description. (Ed.)

specimen was collected in Honolulu by Mr. J. A. Kusche.

Lagocheirus obsoletus.—Mr. Bridwell also recorded rearing *Lagocheirus obsoletus* from *Pseudopanax* and *Euphorbia*. It has previously been reared from Ceara rubber, Allamanda and Kukui.

Prosoplus haukii.—Mr. Bridwell recorded rearing *Prosoplus haukii* from twigs of *Euphorbia*. It has previously been reared from *Crotalaria*, various leguminous vines and klu pods. It is very common on the Ewa Coral Plain.

Coptops aedificator.—Mr. Bridwell recorded rearing this beetle from breadfruit tree, finding the larvae under the bark.

Bruchus sallei.—Mr. Bridwell recorded finding *Bruchus sallei* in Kalihi. It had not previously been found west of Nuuanu Valley.

AUGUST 7th, 1919.

The 167th meeting of the Society was held at the usual place, Vice-President Crawford presiding. Other members present were Messrs. Bridwell, Fullaway, Osborn, Rosa and Bryan.

The minutes of the previous meeting were read and approved with corrections.

Mr. Edwin H. Bryan, Jr., was elected to active membership.

NOTES AND EXHIBITIONS.

Tortricid from almond.—Mr. Fullaway exhibited an unidentified Tortricid moth reared from an almond nut.

Malachiid beetle.—Mr. Fullaway exhibited a specimen of a beetle new to the islands, belonging to the family Malachiidae, captured July 16th, 1919, in an insectary at the Government Nursery, Honolulu.

Calandra linearis var. *striata.*—Mr. Bryan reported finding

the tamarind weevil very numerous in the pods and seeds of the tamarind tree growing in the yard of the Central Union Church. In the same pods were found a great many of the larger tamarind weevils (*Caryoborus gonagra*). A species of Bethylid (*Perisierola*) was also found, which seemed to be parasitic on a small pink caterpillar. The caterpillar lived, however, forming a cocoon, from which a small moth emerged, determined by Mr. Swezey as *Myelois ceraloniae*.

MISCELLANEOUS NOTES BY MR. BRIDWELL.

Euscelinus peregrinus.—This species has been reared from *Sinoxylon conigerum*.

Ischiogonus palliatus.—This parasite was secured from a koa log with larvae of *Plagithmysus pulverulentus*. Two or three lots were also reared from *Neoclytarlus*. It requires two to three weeks from egg to adult.

New Food Plant of Pink Boll Worm.—On July 4th, in Nuuanu, above pumping station, *Hibiscus youngianus* was found. The dry pods contained a pupal skin positively determined by Mr. Swezey as that of *Pectinophora gossypiella*. It is worthy of note that Hillebrand in his Flora of the Hawaiian Islands, p. 51, in a note on *Gossypium* (now *Kokia*) *drynarioides* Seeman says: "The ripe seeds are mostly spoiled by worms, for in consequence of the imperfect dehiscence of the capsule they are retained an undue length of time." It is probable that the injury referred to was caused by *Pectinophora*.

Schistocerus cornutus.—This Bostrychid was found boring in twigs of small diameter. The eggs are deposited in the bottom of the burrow; the larvae continued to burrow further down; in this way the insect serves as a twig-pruner. Kiawe twigs have often been found following the recent storm completely destroyed in this way. Somewhat similar work is done by *Sinoxylon*, but *Sinoxylon* frequently uses considerably larger wood, while the bulk of *Schistocerus* bores comparatively small

twigs. It has been found in *Euphorbia*, dead hibiscus, bamboo, dead dry sugar cane, etc. It makes a characteristic noise in working.

Eupelmus species.—A large species of *Eupelmus* was reared from *Neoclytarlus*, probably new, and one of the largest species found.

Gordius.—Mr. Bridwell also exhibited a specimen of this parasitic worm infesting caterpillar in dead ieie stem.

Trypoxylon bicolor.—He also reported finding nests of *Trypoxylon bicolor* in the mountains since 1915, but few on the lowlands. The cocoon is long and tapering and separated from the container; at the bottom is a well in which the meconium is left so that it does not contaminate the larva.

SEPTEMBER 4th, 1919.

The 168th meeting of the Society was held at the usual place. Messrs. Timberlake, Williams, Willard, Grinnell, Pemberton, Osborn, Rosa and Bridwell present. No officers being present, Mr. Pemberton was chosen as Chairman and Mr. Bridwell as Secretary pro tem.

The minutes of the previous meeting were read and approved.

NOTES AND EXHIBITIONS.

Eristalis aeneus.—Mr. Osborn reported *Eristalis aeneus* being taken by Mr. Swezey dead in a window in one of the H. S. P. A. Experiment Station buildings. He exhibited five individuals he had subsequently taken upon the Station grounds Aug. 29th-Sept. 3rd, 1919. Mr. Bridwell reported having taken one specimen near Sisal on the Ewa Coral Plain, Sept. 30th, 1919. This species has not previously been reported from the Hawaiian Islands.

Itonidid.—Mr. Osborn also exhibited Itonidid flies bred from larvae associated with and feeding upon the sugar

cane aphis at Waipio, Oahu. One larva was observed sucking the juices from the leg of an aphis.

Pachyneuron anthomyiae.—Mr. Timberlake exhibited two specimens of *Pachyneuron anthomyiae* Howard, bred by Mr. Osborn from *Leucopis nigricornis* from the H. S. P. A. Station grounds. This is the first record of the species in the Hawaiian Islands. It is the third or fourth species of the genus now established in Hawaii.

Deinomimesa haleakalae.—Mr. Timberlake exhibited and gave notes upon the habits of *Deinomimesa haleakalae*, which he had found abundantly at the edge of the forest on Mount Haleakala, Maui, at elevations of about 5,000 feet. He observed females carrying adults and nymphs of species of the Jassid genus *Nesophrosyne*, which they were storing in their nests. They burrow horizontally in low banks along the trails. He was, however, unable to dig them out since the nests extended several inches into the stiff, clayey soil. A species of *Crabro* was found nesting in the same banks.

Short-winged Jassid.—Mr. Timberlake exhibited specimens of a short-winged flightless Jassid, possibly representing a new genus, taken by him on Mount Haleakala upon a native grass, not yet determined, at elevation of 7,000 feet.

Coelopencyrtus swezeyi.—Mr. Timberlake exhibited specimens of *Coelopencyrtus* bred by him from the larvae of *Odynerus nigripennis* taken by Mr. Swezey at Kealakekua, Kona, Hawaii, at an elevation of about 3500 feet. One hundred and forty females and two males were reared from a single larva of the *Odynerus*.

Xanthoencyrtus fullawayi.—Mr. Timberlake exhibited two specimens of *Xanthoencyrtus fullawayi* reared by him from *Pseudococcus saccharifolii* taken at Naalehu, Hawaii. These are the third and fourth specimens of the species known.

New Locustid.—Mr. Pemberton exhibited a specimen of an undetermined Locustid supposed to be new to the Hawaiian Islands, taken by him at light at Hilo, Hawaii, on July 25th,

1919. Brother Matthias Newell has since reported to him the finding of an additional specimen at Hilo.

Trox sp.—Mr. Pemberton exhibited a specimen of a small undetermined species of *Trox* taken by him at Hilo, Aug. 24th, 1919. This may be the species recorded by Perkins, also taken near Hilo.

Cylene crinicornis.—Mr. Pemberton reported observing the algaroba borer (*Cylene crinicornis*) feeding in numbers upon the juice in the pits on the surface of the young fruit of the Noni (*Morinda citrifolia*) from which the flowers had recently fallen.

Sclerodermus tantalus.—Mr. Bridwell reported taking recently at the Nuuanu Pali an additional individual of *Sclerodermus tantalus*, previously known only from the unique type. *S. chilonellae* was recently taken on the Waianae coffee plantation in dead wood of coffee associated with larvae identified by Mr. Swezey as those of a species of *Semnoprepia*. Neither of these insects has previously been observed in the wood of introduced plants. *S. chilonellae* has not previously been taken in the Waianae Range.

Silaon rohweri.—Mr. Bridwell exhibited the larval food and cocoons of *Silaon rohweri*, recently discovered by him at Waianae village. The present material was found near Sisal on the Ewa Coral Plain in the pupal chambers of *Neoclytarbus euphorbiae*. The larval food consists of nymphs, apparently of a Lygaeid bug, *Nysius* sp.

Crabro unicolor.—Mr. Bridwell reported finding at the Nuuanu Pali numerous cells of *Crabro unicolor* stored almost exclusively with adults of *Ceratitis capitata*. Aside from these, two individuals of the lantana gall fly and two large Drosophilid or allied flies were the only other species represented. From 8 to 14 flies were stored in a cell and the material contained perhaps three hundred flies. The locality where they were found was on the leeward side of the ridge north of the road, where the flies, caught up by the wind on the

guava-covered windward slopes of the mountains, would be likely to be found. The locality is notorious for the force of the wind. Mr. Williams has previously reported finding a single nest of *Crabro lumidoventris* in a somewhat similar locality at a higher elevation stored with *Ceratitis capitata*. The utilization of this fly by these native wasps is noteworthy. Probably the natural slowness of flight is increased in these localities by the effect of the wind and the lower temperature.

Bruchus limbatus.—Mr. Bridwell reported that the Bruchid recently bred by Mr. Swezey from the seeds of the monkeypod (*Samanea saman*), is apparently *Bruchus limbatus* Horn, previously known from Southern California, and Lower California to Texas, and has been bred from *Siderocarpus flexicaulis* and an undetermined chaparral plant known as *tenaza*. He has found it at Makiki Heights, where it had bred from eggs laid on the pods. He had bred it in numbers from eggs laid upon the seeds.

Newly imported insects from Australia.—Mr. Williams reported the liberation at Mountain View, Hawaii, of colonies of the Carabid enemies of the sugar cane leaf hopper recently brought by him from Australia. These colonies consisted of:

68 *Drypta australis*, Dej.

2 *Drypta mastersii* Macleay.

66 of a green *Drypta*.

4 *Chlaenius* beetles with yellow spots. For cutworms.

There were also liberated at Waipio, Oahu, the following Aphis enemies, also from Australia:

30 adults of *Coccinella repanda*.

28 adults of *Coccinella arcuata*.

3 adults of a Syrphid.

6 green *Chrysopa* sp.

A Hemerobiid, *Micromus*, was liberated in numbers at Wailuku and Lahaina, Maui, and at Waipio, Oahu, and Honolulu Experiment Station grounds (6 specimens), Oahu. One female *Paralastor* wasp was liberated at the Station grounds,

Honolulu. Four specimens of a black *Chelonus* wasp and 4 specimens of a small *Orthophagus* beetle were liberated in Honolulu and at Wahiawa respectively by D. T. Fullaway. The Coccinellids are also being bred in the laboratory. All this material was recently brought by Mr. Williams from Herbert River, Northern Queensland.

Syrphid flies from California.—Mr. Osborn reported the breeding and liberation of a mixed colony of about 60 adults of *Eupeodes volucris, Syrphus americanus* and possibly other species. These were first placed in a large cage containing aphids on cane in order to give opportunity for mating, and then released on the H. S. P. A. Station grounds. This material was forwarded from the California State Insectary at Sacramento.

OCTOBER 2nd, 1919.

The 169th meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Bryan, Ehrhorn, Osborn, Rosa, Swezey, Timberlake and Williams.

In the absence of the Secretary, Mr. Bridwell was appointed Secretary pro tem.

Minutes of the previous meeting were read and approved.

PAPERS.

The Tahiti Coconut Weevil, Calandra taitensis Guerin, in Hawaii.

BY O. H. SWEZEY.

This insect was described from Tahiti in 1840, by Guerin, in Iconographie der Regne Animal, page 171, and figured on plate 30, Fig. 4.

Doane, in Notes on Insects Affecting the Coconut Trees of

the Society Islands (Journ. Econ. Ent., 2, pp. 220-223) describes the work and habits of the larvae.

An account of this weevil is also given by Zacker in Die Schädlinge der Kokospalmen auf den Südseeinseln (Arbeiten aus der Kaiserlichen Biologischen Anstalt fur Land- und Forstwirtschaft, IX, p. 100, 1913). He says it is not found elsewhere.

I have not found any record of its occurrence elsewhere, but in the collection of Samoan insects received by Mr. Giffard from Dr. H. C. Kellers, is one specimen of this weevil labelled: Tutuila, Samoa, 900-1200 feet, inland, 1918.

August 13th of this year, Mr. Timberlake secured a specimen of this beetle while sweeping on grass beneath tall coconut trees at Honaunau on the western coast of Hawaii. Searching further for specimens, both he and I collected quite a series of them from younger coconut trees growing nearby. The larvae were also found in abundance where they were feeding in the leaf petioles. The beetles themselves were most readily found on cut-off ends of petioles, tho they were also found beneath the fibrous layers covering the trunk of the tree.

The presence of the larvae was indicated by the conspicuous gummy exudation from small holes near the margins of the petioles towards their bases. This was in living leaves, and they apparently were not particularly injurious, for the grove of growing coconut trees was in as fine condition of growth and appearance as is ever seen. That the weevil has been present at the place for some time (perhaps several years) is indicated by the presence of the holes caused by the larvae on old dried-up leaves near the base of the young trees.

On August 18th, I found evidence of the occurrence of this weevil on coconut trees at Honuapo on the south coast; and on August 21st at Kailua; and Sept. 5th at Kawaihae. Thus indicating its distribution on the whole leeward coast of the Island.

On August 31st, I made quite a search on coconut trees in

and near Hilo, but without finding any traces of the presence of the weevil. Since that time, I have also searched for it on coconut trees in Honolulu, at Waikiki, and at Moanalua, without finding any evidence of it. Perhaps it is not present on the Island of Oahu. If so, it furnishes an example of an insect immigrant becoming established first on another Island of the group than the one containing the main port, Honolulu. The method of its arrival is a subject of conjecture, especially as, where it is present on the Island of Hawaii, is the opposite side from Hilo, the main port, where it is not to be found.

Specimens were sent to Dr. Guy A. K. Marshall of the Imperial Bureau of Entomology, who confirmed the identification of the species and its being distinct from *frumenti*, the species on coconuts in the Philippines and the Malayan and Asiatic regions.

The Genus Phytometra (Plusia) in Hawaii (Lepidoptera).

BY O. H. SWEZEY.

Two immigrant species have been known in the Hawaiian Islands for some time: *chalcites* Esper and *biloba* Stephens. Both are listed under *Plusia* in the Fauna Hawaiiensis, I, page 159, 1899. The former is quite a cosmopolitan species and a garden pest. It is found abundantly throughout the Hawaiian Islands and even on Midway Island. *Biloba* is an American species and is only rarely collected here, but is probably on all the islands, having been collected at Kona, Hawaii; Haleakala, Maui; and on Lanai by Dr. Perkins; at Kilauea, Hawaii, by Mr. Giffard; and at Halemano Kauai, by Mr. J. A. Kusche.

P. pterygota Meyrick was the first endemic species discovered. It was described in the Fauna Hawaiiaensis, III, Pt. IV, page 348, 1904, from a single male specimen collected by Dr. Perkins on Mt. Tantalus, Oahu. The female was first colected at Kilauea, Hawaii, by Brother Matthias Newell.

Dr. Perkins, to whom this specimen was given, at first thought it a distinct but closely allied species and drew up a description under the name *P. newelli* after its discoverer. This name was never published, however, for, as Dr. Perkins has written me recently, when he gave the specimen to the British Museum several years ago, Sir George Hampson determined it as the female of *pterylota*. It is recorded in the Catalogue of the Lepidoptera in the British Museum, XIII page 453, 1913, where both sexes are described and the male is figured. The habitat as given there is incorrect. Instead of "Hawaii, S. S. Korlan Range, 1 ♂ type; Kilauea (Perkins), 1 ♀," it should be corrected to read "Oahu, S. E. Koolau Range (Mt. Tantalus), 1 ♂ type; Hawaii, Kilauea (Newell), 1 ♀."

An occasional specimen of this species has been taken of recent years by Mr. Giffard at lights at his bungalow near Kilauea, Hawaii; and Brother Matthias has recently presented me with a specimen taken at Hilo, Hawaii. On September 14th of this year, Mr. Williams collected a specimen on the ridge at the south side of Iao Valley, Maui. This is the first record of its capture on that island.

P. giffardi Swezey was described in Proceedings of the Hawaiian Entomological Society, II, page 234, July, 1913, from specimens collected at light by Mr. Giffard at his bungalow near Kilauea, Hawaii, in 1911 and 1912. A specimen was collected previously, however, on Maui, by the late F. W. Terry. This specimen was sent to the British Museum, and has since been described as *Phytometra pseetrocera* and figured by Sir George Hampson in the Catalogue of the Lepidoptera in the British Museum, XIII, pages 453 & 454, Dec., 1913. The habitat there given should read "Kampo Trail," instead of "Campo Trail." Comparing specimens of *giffardi* with the description and figure of *pseetrocera*, I find them to agree, hence, as both species were published in the same year, and *giffardi* earlier in the year than *pseetrocera*, the latter will be a synonym of the former.

Mr. Giffard occasionally secures more specimens of this

moth from the same locality at Kilauea as given above. There are no other records of its distribution in the Islands.

All of the above species except *pseetrocera* were described under *Plusia*. Conforming with Hampson's usage in the Catalogue above referred to, they are now all in the genus *Phytometra*. I now add the description of the third endemic species of the genus.

Phytometra violacea n. sp.

♀. Head, thorax and crests on the abdomen greyish brown, many of the scales tipped with violet. Palpi of the same color with a sprinkling of violet. Antennae pale brown. Abdomen grey, with a slight crimson tinge ventrally. Legs greyish brown, with a sprinkling of ochreous. Fore-wings brown, with much suffusion of pale violet, particularly preceding first line, a transverse band following second line, a well-defined patch at tornus and a narrow strip on termen between the latter patch and the apex; in the costal area near base is a small patch of crimson crossed transversely by a sinuate creamy white line; first line creamy white, from about one-third of costa extending obliquely backward to the cell, obsolete in the cell, dorsal from the cell quite evenly curved to near inner angle, a few crimson scales scattered along both sides of line; second line creamy white, unevenly sinuate, angulated inwardly at the fold, obsolete on the costal area; a creamy white spot on dorsal margin, narrow basally, somewhat bilobed apically and one lobe extending into the cell, in one wing the dorsal lobe is connected with the first of the two oval creamy white spots obliquely placed along dorsal side of vein 2; an oval creamy white spot at end of cell, with a narrow extension towards costa; cilia mostly violet, brown at middle of termen. Hindwings fuscous brown, basal half paler, cilia concolorous. Expanse of wings, 36 mm.

Closely related to *pterylota* but differs in the predominating violet suffusion, whereas *pterylota* has much crimson suffusion; and also in the shape of the second line which is more evenly curved in *pterylota* and does not have the inward angulation at the fold which is present in *violacea*.

Hab. Kokee, Kauai, January, 1919. A single specimen collected at light by Mr. J. A. Kusche. Type in collection of Hawaiian Entomological Society.

NOTES AND EXHIBITIONS.

Plusia pterylota.- Mr. Williams exhibited a specimen of this beautiful rare moth, recently taken by him on the ridge at the southern side of Iao Valley, Maui. The species has been

previously taken on Oahu and Hawaii, but this is the first record for the Island of Maui.

Kilauea Moths.—Mr. Giffard exhibited a collection of moths recently taken by him at light at his place at 29 Miles, Hawaii. Among them were *Plusia giffardi, P. biloba* and the endemic Sphingid, *Celerio wilsoni.* He discussed the very great variation in the numbers of moths coming to light there at various times in the year.

New Nitidulid.—Mr. Timberlake exhibited an apparently unrecorded Nitidulid. The species is undetermined but is apparently an immigrant. It was recently taken by him from a greasy tin on Mt. Haleakala, Maui.

Pseudospectra lobipennis.—Mr. Timberlake exhibited a series of specimens of this peculiar endemic Hemerobiid, taken by him on Mt. Haleakala. It is the only species of one of two endemic genera in which the wings are greatly reduced and are incapable of being used in flight.

First records on Hawaii.—Mr. Swezey reported recently taking the following immigrant species on the Island of Hawaii. It is believed to be the first record of these species on that Island:

Bruchus pruininus at Napoopoo.
Caryoborus gonagra at Napoopoo and Kawaihae.
Heterospilus prosopidis at Honaunau and Kawaihae.

Formicaleo wilsoni.—Mr. Swezey reported seeing an antlion, presumably this species, in the rocky bed of the canyon about a mile north of Kawaihae, Hawaii. The species has not previously been recorded as occurring in West Kohala nor near the coast.

Teralura sp.—Mr. Swezey reported taking at Hilo two females of the same new immigrant Locustid recently recorded by Mr. Pemberton. As far as can be determined from females, it appears to be an undescribed species of the genus *Teralura.*

Nesotocus munroi.—Mr. Swezey exhibited a large series of this large peculiar weevil, taken by him in the Kohala

Mountains of Hawaii, on trees of *Cheirodendron gaudichaudii*. The larvae were abundant, feeding in the inner layers of bark of dying branches of the trees similar to the way the larvae of *N. giffardi* do on the Island of Oahu.

Celerio calida.—Mr. Swezey reported recently breeding a specimen of this endemic Sphingid from a pupa found in a cavity in a dead branch of a *Cheirodendron* tree, the opening to the cavity being closed by a slight web. This was at an elevation of about ten feet from the ground on a tree standing by the Manoa Cliffs Trail on the back side of Tantalus, Oahu. It is thought that the caterpillar fed on some other tree than the *Cheirodendron*, and sought this as a convenient place for pupation.

Aphis-feeding Itonidid.—Mr. Osborn gave further notes on the habits of the aphis-feeding Itonidid recently reported by him. The species proves to be more abundant than had been previously supposed.

Eristalis aeneus.—Mr. Osborn reported seeing this recent immigrant Syrphid at Waiamae. Mr. Ehrhorn reported seeing this fly hovering about cellular lava rocks in Manoa Valley. The species is now exceedingly abundant in Honolulu.

Diachus auratus.—Mr. Bryan reported finding this immigrant Chrysomelid at Wailuku, Maui, and exhibited leaves of garden roses which showed the characteristic injuries caused by the feeding of the adult beetle.

Sclerodermus.—Mr. Bridwell gave further notes on the habits of various species of *Sclerodermus*.

Silaon rohweri.—Mr. Bridwell reported breeding the male of this species from the material exhibited last month.

A Dipterous parasite of Corixus hyalinus.—Mr. Bridwell exhibited specimens of a muscoid larva found by Mr. Swezey in specimens of the Lygaeid collected by him from *Euphorbia* on the Ewa Coral Plain near Sisal, which were unfortunately killed before the parasitism was discovered. The larva occu-

pies nearly the whole of the abdomen, the bug apparently being not seriously inconvenienced by this condition.

What the adult fly may be is uncertain, but a small Tachinid fly has been occasionally found in the regions frequented by *Corizus*.

Nesolocus mauroi.—Mr. Giffard exhibited a specimen taken by him dead at 29 Miles, Olaa, Hawaii, Sept., 1919.

Kelisia spp.—Mr. Giffard exhibited large series of two species of this Delphacid genus, from the Island of Hawaii, with the following notes: At Kilauea, early in September, he took a large series of both sexes together with nymphs of a species which Mr. Timberlake had discovered early in August on the grass *Deschampsia australis*. The species is believed to be new, and by the edeagus is closely allied to *K. swezeyi* of Oahu.

Of the second species, a good series of both sexes and nymphs was taken by him at Kilauea early in September, on the sedge *Vincentia augustifolia*. This is *K. sporobolicola*, or very closely related to it. It was originally taken at Puako on Hawaii and on Oahu at sea level, but has since been taken on Haleakala, Maui, by Bridwell in 1918, and by Timberlake in 1919. So far the genus *Kelisia* is represented by two species on Hawaii, two on Maui, and five on Oahu, all the species known in the Islands occurring on Oahu except the one mentioned above from Hawaii.

Syagrius fulvitarsis.—Mr. Giffard reported the discovery by Mr. Fullaway and himself of a severe local infestation of the native *Sadleria* ferns at 29 Miles, Olaa, Hawaii, by the Australian fern weevil, and reported on the measures taken to eradicate this local colony. The infestation was apparently confined to about seven acres, and after boundary lines of the area had been laid out instructions were given to cut and burn all *Sadleria* and *Asplenium* stalks and stumps on the area, and appliances were secured to burn over the ground after it had been bared. The Board of Agriculture and Forestry

has undertaken to carry out the work of eradicating this colony. Mr. Giffard considered that the area had not been infested for a greater time than six or seven months.

NOVEMBER 6th, 1919.

The 170th meeting of the Society was held in the usual place, Vice-President Crawford in the chair. Other members present: Messrs. Bridwell, Bryan, Ehrhorn, Pemberton, Potter, Rosa, Swezey, and Timberlake.

In the absence of the Secretary, Mr. Bridwell was appointed Secretary pro tem.

Minutes of previous meeting were read and approved.

A Committee was appointed to prepare an additional list of common names for Hawaiian economic insects. Messrs. Timberlake, Pemberton, and Bridwell.

PAPERS.

Some new Hawaiian Coleoptera.

BY DR. R. C. L. PERKINS, PAIGNTON, ENGLAND.

(Presented by Mr. Swezey.)

This paper deals with a small consignment of beetles belonging to the Longicorns of the tribe Plagithmysini, and to the family Proterhinidae, recently sent to me for determination and description by Messrs. O. H. Swezey and J. C. Bridwell. The type specimens of the new species in this lot will be deposited in the collections of the Hawaiian Entomological Society. In addition to these I have described a few new species of *Proterhinus* of my own collecting which I had occasion to examine in the course of working out the others. The types of these are in my own collection.

The specimens sent had been collected with great care and in nearly every case the trees or plants on which they were found had been carefully noted. This is of great importance

in the case of the Longicorns, but even more so in that of the excessively difficult genus *Proterhinus*, for without such data one may well despair of arriving at any definite conclusion as to the validity of many of the species, the variation often being excessive and the distinguishing characters very slight and difficult to appreciate. At present I am myself left with a collection from all the Islands of hundreds or thousands of undetermined or dubious, though well-mounted, specimens. If it were possible for me to receive other such consignments, carefully collected with data, I should hope to be able after a time to revise the whole genus, and possibly to make some such tabulation of the species as would facilitate their identification. As might have been expected, some of the species formerly described by me are now known not to be distinct, while others once thought to be confined to one Island, I have subsequently taken on others. Some of the earlier species contained more than one form under the same name. In my collection these mistakes have been mostly rectified, but I have not had the opportunity of making the same corrections in the other collections. In this paper, I have not dealt with such matters to any considerable extent, as it has been advisable to complete the descriptions of new species and return the specimens as quickly as possible, because all my collections have to be packed up for an almost immediate removal to a new address.

I would urge those, who are fortunate enough to have the opportunity of collecting further specimens, to aim at getting together a smaller collection of specimens with accurate notes as to food plants and other data, rather than a much larger one collected at random, though the former method occupies much more time. I feel sure that it is only from careful collecting of specimens that really definite results are to be expected. In examples collected at random one can always pick out certain species, as obviously distinct, but a large amount of the material will remain dubious or undetermined. At most one can say that specimens without careful notes as

to food-plant, etc., are better than nothing. Casually collected examples in indifferent condition are almost valueless.

Cerambycidae, Plagithmysini.

Nesithmysus gen. nov.

This name is proposed for a large species of the Plagithmysini, with a much wider prothorax than that of *Plagithmysus*, this part being hardly less wide in the middle than the base of the elytra. The latter are long, less pointed or cuneate than in *Plagithmysus*, and the wings in repose are shorter, so that the tips which are bent inwards, can be almost, if not quite, covered by the elytra. Owing to the length and form of the wing-cases, the insect has a heavy and less elegant facies than that of the other genus. The pronotum has a median crest well elevated in front and behind, the ridges on either side of this are represented by black callus lines elevated into strong tubercles posteriorly. The second and following joints of the antennae have only very sparse fine hairs. The hind femora have a well-marked apical club, very similar to that of some species of *Clytarlus*. The hind tibiae and tarsi are only thinly clothed with hair and differ greatly in this respect from normal *Plagithmysus*. The elytra have no definite pattern of markings, being clothed with extremely minute pubescence, but at the extreme base between the scutellum and the shoulders there is an indefinite area clothed with longer and denser yellow hair.

Obs. I do not think it possible to retain this insect in either of the two genera referred to above, but it is more nearly allied to *Clytarlus* than to the other. Dr. Sharp has already pointed out that certain species described by him, having intermediate characters, are placed with difficulty. At present, I find it convenient to assign to *Plagithmysus* all those species which closely agree in the dense clothing of the hind tibiae and tarsi, although this causes some changes in the arrangement adopted in the "Fauna Hawaiiensis". This plan will throw into *Clytarlus* some species now included under *Plagithmysus*, but which in general facies seem to agree better with the former. I have alluded to this matter because one of these troublesome forms is described below.

Nesithmysus bridwelli n. sp.

Ferruginous or rufescent; the head black, thorax beneath largely black or dark. A stripe on the median crest of the pronotum (varying in

width), one on each side of this, not reaching either the front or hind margins, and ending in a bifid dilatation at the posterior tubercles, a small spot on each side at about the middle of the length of the pronotum, black. More or less of the scutellum, the extreme tips of the femora and the apices of the hind tibiae (at least beneath) are also dark. Face beneath the antennae with yellow hair, an indefinite pubescent patch of this color at the base of each wing-case and a spot at either extremity of the mesopleura; breast with pale flavescent pubescence. Sides of abdomen with minute appressed pubescence and closely punctured, the general surface between these shining, sparsely punctured and clothed with erect, fine hairs. Fifth ventral segment excised at the apex in the middle.

The pronotal crest is much more pointed in front in one example than in the other, but such variation is common in *Plagithmysus*. The individuals examined have the appearance of being females, but the sex is not certain without dissection. Length, 22-24 mm.

HAB. Oahu, Mt. Kaala; one on ohia lehua July 4, 1916 (O. H. Swezey); one on July 22, 1917, on *Broussaisia* (J. C. Bridwell). Described from these two examples.

Plagithmysus swezeyi n. sp.

Head, pronotum and breast red, elytra black. Legs black or nearly so, but the femora are red on the basal portion, more yellow in the case of the hind pair, where the pale portion occupies about half their length. Antennae dark brown or blackish fuscous. Hairs of the hind tibiae and tarsi dark. Face with minute white hairs (perhaps abraded), labrum and the adjoining part above with yellow setae. Pronotum with a narrow snow-white band on either side of the median crest, the bands not dense, and a trace of a small white spot on the middle of the densely punctate sides. Elytra shining, roughly punctured on the basal portion and with small spots (not closely placed) of snow-white hairs; on the posterior half the spots are placed in a line on either side of the suture and become minute towards the apex; the spots are mostly much separated from one another. Mesopleura with a dense white spot in front and behind. Hairs of the hind tibiae and tarsi dark. Length, male, 15 mm., with the exposed tips of wings.

This very elegant species belongs to the *vitticollis* group, and should be placed next to *P. longulus* (which will probably prove distinct from *P. vitticollis*). It is readily distinguished by the red head and pronotum and the two narrow snow-white pronotal vittae. The female will very likely have a smooth impunctate area on the sides of the pronotum.

HAB. Hawaii, Niulii. A single male, captured May 19, 1917, by Mr. Swezey, is the only example I have seen.

Plagithmysus platydesmae n. sp.

Head and usually the thorax black, but the latter may be pitchy or reddish down the middle. Elytra brown or yellowish brown at the sides and usually on the basal portion in front of the median black-pubescent area. On the middle portion from the base of the furcate lines to the tips they are darker, generally nearly black or dark brown. In one example the dark part occupies all the middle right up to the base, only the humeral section of the base being brown. Antennae dark, the scape more or less red, and the following joints sometimes also red-tinged. Femora red, black at the apex.

Face densely clothed with yellow hair, the pronotal vittae dense, yellow, usually broad, the lateral ones occupying the whole deflexed sides, except that they enclose or are deeply divided by a glabrous strip. Elytra with a deep black tomentose spot across the suture towards the base (as in the other members of the *bishopi* group), in front of this with by no means dense, yellow hairs, and more or less roughly punctured; the longitudinal lines furcate, of dense yellow hairs and with a feeble line of the same color produced backwards from the tip of the furcation on each side. On the apical portion of the elytra the punctures become obsolete or subobsolete. Mesopleura with a continuous, or almost continuous, band of dense yellow hair, and the abdominal segments with a dense band of the same color, broken into spots if the segments themselves are greatly distended. Hind tarsi with dense white hairs. Breast beneath with a yellow band reaching from the front to behind the middle coxae. Length, 13-18 mm.

One example, which is certainly a female, has the glabrous area enclosed in the band on the side of the pronotum highly polished to a large extent; but another, which, from the appearance of the abdomen, is also of that sex, has it dull, and densely punctured, as in the male.

Most like *P. collaris* of Maui, but with totally different pronotal ornamentation, and with the apical portion of the elytra much less definitely punctured.

Hab. Hawaii, Glenwood (March 2, 1919, Swezey). Seven examples bred from affected wood of *Platydesma campanulata* brought down from this locality to Honolulu. The description is drawn up from these examples. All the other members of the *bishopi* group are known to be attached to *Pelea*, which is placed next to *Platydesma* in Hillebrand's "Flora". *P. bishopi* was bred by me from *Zanthoxylum* (also an allied tree) as well as from *Pelea*.

Plagithmysus elegans Sharp.

I possess the female of this species. It does not seem to

differ in any important manner from the male described by Sharp.

Plagithmysus giffardi Perkins.

I think it possible that there were two species contained in the eight examples on which *P. sulphurescens* was originally described. Most of the examples taken were found on *Urera*, in which tree it was breeding; some had to be kept alive in order to become mature. Two or three specimens, however, were captured on the wing in a slightly different locality and it is possible that these were the same as the form I subsequently described as *P. giffardi*. Both in the diagnosis and in the English description, Dr. Sharp refers to the "rufescent" or "fulvotestaceous" area at the base of the elytra, and this accords with my recollection of the specimens obtained on *Urera*. The figure in the "Fauna Hawaiiensis" does not show these markings and may have been made from one of the examples taken on the wing and likely to be *giffardi*. In the remarks on variation, Dr. Sharp refers to a reduction of the black color, but not to its extension in any of the specimens. Although I have in the past had many specimens of *giffardi*, and still have a score left, I have seen none with the elytral markings of *sulphurescens*. All the former were from *Myrsine* (now known as *Suttonia*).

Clytarlus indecens n. sp.

Head and pronotum dull red, sometimes nearly entirely suffused with black, the femora not much different from these in color, generally of a browner tint; hind tibiae more yellow, paler than the femora, distinctly dark on about the apical third or fourth. Antennae for the most part testaceous, and nearly concolorous with the elytra. The general appearance is that of *C. modestus* Sharp, but under a moderate lense the pronotum and elytra appear glabrous, while under a compound microscope it is seen that a short seta springs from each of the elytral punctures. There is no pattern of any sort formed by pubescence and the elytra are densely, somewhat strongly, rugulosely punctured, the sculpture distinct even at the sides and on the apical portions. Two slightly raised parallel lines extend from the base to beyond the middle of the wing-cases, and another pair outwardly and parallel to these from the neigh-

borhood of the shoulders. The hind femora are thin at the base and then gradually dilated to near the apex, quite unlike normal *Clytarlus* and in fact much more like true *Plagithmysus*. They are less like those of the former genus than are those of the abnormal *P. immundus* Sharp (F. H. III, 646). The hind tibiae and tarsi are very inconspicuously hairy (see remarks above under genus *Nesithmysus*). Length, 7-10 mm.

Obs. All the typical *Clytarlus*, as at present known, are attached either to *Acacia koa* or to *Sophora chrysophylla* and although many *Plagithmysus* feed on these, others affect most varied plants. Those species of *Clytarlus* which are not attached to the Acacias are abnormal in structure and will probably be separated generically from either genus in the future.

Hab. Oahu, Mt. Kaala; one example (the type) collected by H. T. Osborn, Sept. 7, 1913; three examples bred from dead stems of *Smilax* (July 9, 1916, Swezey). The description is mainly drawn up from the type and best preserved specimen. The other three examples all appear to have died before becoming properly mature and are not in good condition, though easily identifiable.

Proterhinidae.

Proterhinus swezeyi n. sp.

A large species with the surface of the pronotum and elytra very uneven and the erect setae very long, numerous, and conspicuous. Reddish fuscous, some parts (e.g. the humeral parts of the elytra) being more red, others more obscure in color. Legs and antennae red, the former of paler color than the latter.

Rostrum of the female short, hardly longer than its greatest width, eyes well-developed and extremely prominent, not differing much from those of some examples of *P. deinops*, but the head has not the strong transverse constriction of the latter. The rostrum is not polished in the middle, but minutely sculptured there, and the grooved lines on each side of this owing to the sculpture towards the sides being longitudinally rugose do not stand out distinctly. Antennae slender and of good length; the scape elongate triangular, and stout; the club slender, 3-jointed, its basal joint elongate and by no means wide, but being much wider at the apex than the preceding joints, the club as a whole is well-marked. Pronotum strongly and suddenly narrowed anteriorly, the constricted part longer than in most species, with a large round fovea or impression on each side behind the constriction, the part between the foveae sub-

impressed, so that two more or less evident ridges are formed between this impression and the lateral foveae in some aspects. Elytra with the humeral angles produced or subacute, and with a distinct, densely setose tubercle on either side of the scutellum, the space between these tubercles and the humeral angles strongly impressed. The mid-dorsal portion of the elytra, for about two-thirds of their length, is flattened, but uneven, bare and depressed areas occurring amidst the squamosely clothed surface. The flattened area forms at its junction with the decurved sides a pair of uneven longitudinal ridges, each terminating posteriorly as a raised tubercle, owing to the apical portion of the elytra being of simple convex form. The squamous covering of the pronotum and elytra is of a greyish golden color and is dense, but unevenly distributed, so as to form maculations on the elytra. The erect setae are very long and spiniform, as also are those on the legs. The lobes of the tarsi are of moderate size. The punctures of the basal abdominal segment beneath remain coarse and distinct on the middle part. Length, female, 5 mm.

Hab. Oahu, Mt. Olympus (near Honolulu), Sept., 1917. A single female of this interesting and beautiful species was obtained by Mr. Swezey from the native palm, *Pritchardia martii*, an uncommon tree on Oahu. In some respects it appears to be a connecting link between the *blackburni* group and the other members of the genus.

Proterhinus euops n. sp.

Head and thorax of a sordid red, or reddish black, quite red if somewhat immature; the elytra red and black, as a rule extensively dark with the sides, base and apex more red, and the dark area containing red spots. The antennae are somber red and the legs much paler than these or ferruginous.

Pronotum with almost even clothing of golden squamosity, which is not very dense, but with a small distinct dense spot, often nearly white at the hind angles. The elytra are maculate, the pale parts bearing golden and whitish squamosity or appressed setae, the dark areas being bare, while the erect white setae are of moderate length, numerous, and very conspicuous on the posterior parts.

Head with large, outstanding, subconical eyes; strongly constricted behind these, so that an evident transverse ridge is formed. Antennae rather long, with slender three-jointed club, the ninth joint being considerably wider at the apex than the eighth. Rostrum of female shining, the punctate grooves distinct. Pronotum and elytra formed exactly as in some large examples of *P. gracilis* Sh., the former constricted in front and there impressed in the middle, the two impressions or foveae behind this very distinct. Elytra long and narrow, nearly parallel-sided until they become rounded off to the apex, the humeral angles acutely

produced, the tubercles near the scutellum covered with dense appressed pale setae and very conspicuous. The punctures are close, coarse and distinct. The basal abdominal segment beneath has the punctures distinct on the middle portion, but they are not close nor coarse on that part. Length, 2.75-3.5 mm.

Hab. Oahu, Mt. Kaala (July 9, 1916, O. H. Swezey). Twelve examples, one or two being immature and newly emerged, on *Euphorbia*.

Proterhinus euphorbiae n. sp.

A red species, the thorax and head often more sordid, the elytra with dark (black or fuscous) spots. The club joints, or at least the two basal ones, usually appear dark compared with the preceding joints of the antennae. The clothing of the insect consists of golden squamosity (fading, no doubt, to whitish) while the elytra bear also conspicuous white erect setae, which are quite numerous on the apical portion.

Head without a raised transverse ridge or constriction behind the eyes, which are only of moderate size. The antennae are very slender (more so than in the preceding) with distinctly 3-jointed club. The rostrum of the female is very smooth and shining, with the punctate grooved lines extremely fine, though more developed in one example than in the others. Pronotum not at all wide, the three impressions distinct, but varying to some extent, the hind angles are rendered distinct by a condensation of the squamous covering, so as to form a pale spot at that point in dorsal aspect. Elytra long, arcuately emarginate at the base, so that the humeral angles are acutely produced, the golden squamosity absent from the dark spots or markings, which are chiefly placed about the middle or on this and the hind part of the surface. The basal abdominal segment is coarsely punctured even on its middle portion. Length, female, 2.5-3 mm.

This species is I think evidently allied to *P. robustus* and the variable *P. heterostictus*, which are both found in the same neighborhood, though the former (as well as the latter) is now known to me to occur also in the Koolau Range. *P. robustus* is distinguished at once by its antennal characters. *P. heterostictus* differs from the species now described in its less narrow and elongate elytra, different pronotal structure, etc. *P. euphorbiae*, though found with *P. cuops*, is not at all closely allied to it, the elytra are only obsoletely tuberculate on each side of the scutellum, or at least the tubercles are not rendered prominent by a special clothing as in the other, and the punctures are much less gross.

Hab. Oahu, Mt. Kaala (July 9, 1916), three females; the same but on the west side (June 1, 1919), two females

evidently older. All were taken from *Euphorbia* and the male was not procured (O. H. Swezey).

Proterhinus impressiscutis n. sp.

A red or ferruginous species with a dark elongate marking on each side of the elytra near the middle of their length. The appressed clothing is golden in fresh examples at least, the head and pronotum being densely clothed. On the elytra a not very distinct stripe, appearing slightly paler, extends from each humeral angle, these stripes being convergent; erect white setae are quite evident along the side margins and on the posterior part of the wing-cases, but they are sparse and short.

Rostrum of the female polished and elongate, about twice as long as wide, and with the impressed punctate lines very distinct and well-marked. Antennae entirely red, slender, with 3-joined club. Eyes small. Pronotum as wide or wider in the middle than the width of elytra at their base, and with the anterior foveae not deep, less evident in a well-clothed example than in a partially denuded one, and rounded at the sides, with little or no appearance of a constriction anteriorly; the posterior foveae are obsolete or indistinct. Elytra subcuneate, the humeral angles distinct, owing to the obliquity of the basal margin of each wing-case, the scutellar region occupied by a deep fovea. Punctures in some aspects very distinct and definite, and not dense. Basal abdominal segment beneath shining, distinctly, but not closely, punctured in the middle, the sternum coarsely punctured. Length, female, *vix* 3 mm.

Hab. Oahu, Mt. Kaala (July 4, 1916); described mainly from a single female captured by Mr. O. H. Swezey on *Euphorbia*. I have once or twice captured single examples that appear to be this species, in the same locality, but without note of food-plant. These specimens are covered with exudation, which I have at present been unable to clean off satisfactorily.

Proterhinus bridwelli n. sp.

A red species, the head and pronotum more sordid or rufofuscous, rostral portion of head black. In some aspects and lights the antennae are entirely red, in others they appear largely dark (male). The elytra have a vague dark marking near or behind the middle on each side. The clothing is golden, the elytra bearing some white spots chiefly on the apical portion and there are a very few short white erect setae on them posteriorly. Eyes prominent, but not large. Antennae with very short globose second joint, the club very definitely 3-jointed, its basal joint being very large compared with the preceding and its apex seen at the widest is hardly less so than that of the following joint. The joints preceding the club are short and submoniliform. Pronotum only

slightly impressed in front and without any strong constriction, the foveae hardly visible, the clothing denser along the sides. Elytra at the base as wide as the pronotum, the humeral angles not sharp, but fairly distinct, the punctures on the basal portion dense, distinct in some aspects and tending to run into one another. There is hardly any impression between the scutellum and the humeral angles, the elytra being of simple form and short, about one and a third times the length of the pronotum. The basal abdominal segment beneath has the punctures on the middle portion very feeble or obsolete. Length, male, 2.5 mm.

Hab. Maui, Iao Valley, Sept., 1918, on *Euphorbia hookeri integrifolia* (J. C. Bridwell). Described from a single male. When I first examined this species it reminded me of the very differently colored (black) *P. breviformis* of Lanai, but on comparing the two, I find the differences of structure (antennal joints, pronotum, etc.) so great that they do not appear to be closely allied.

Proterhinus asteliae n. sp.

A red species, with the antennae entirely red, the head and pronotum with golden squamosity (fading to white); the clothing of the elytra broken up into lines or spots, being variable in extent, so that they are prettily maculate, the bare parts being often black or dark, but sometimes red. Remarkable amongst the species with simple humeral angles to the elytra for the great length of these. The color and maculations resemble those of *P. pteridis*, but that is a still narrower insect, with totally different antennae.

Antennae of moderate length, about three-fourths the length of the elytra, appearing rather short from the elongation of the insect. Second joint as long or longer than the fourth and much more robust, basal joint of the club much less wide at the apex than the second, but notably longer and wider than the last funicle joint. Rostrum of the female very polished, and the punctate lines very feeble. Pronotum somewhat narrow, usually appearing considerably less wide than the widest part of the elytra, the posterior impressions not deep and sometimes obsolete. Elytra twice or even more than twice the length of the pronotum, and about twice as long as their width at the base; they have coarse, deep punctures, generally appearing to form rows on a large part at least of the surface. The erect setae are short and sparse, white, and in dorsal aspect will be noticed on each side of the suture towards the apex. Basal abdominal segment with the punctures feeble or obsolete. Length, male and female, 2.5–3 mm.

Hab. Oahu, Mt. Kaala (July 4, 1916); fourteen exam-

ples (O. H. Swezey). Mr. Swezey informs me that the larvae are miners in the lower part of the leaves of *Astelia veratroides*.

Proterhinus abnormis n. sp.

Red, the elytra with black markings, sometimes almost wholly black. Head rarely black. Antennae red, the club sometimes black. The appressed clothing is of a golden color. The female head is like that of a male, there being no development of the beak such as is usual in the former sex of the genus. Beak short, transverse or at most almost square in outline, the eyes strongly convex, but not large; the antennae with the second joint longer and much stouter than the fourth, second joint of club much wider than the first and in some aspects the club appears almost as only 2-jointed, though its first joint (i.e. the 9th antennal joint) is really both longer and evidently wider than the 8th.

Pronotum with three depressions, the hind ones sometimes feeble (liable to be concealed by excretions), its sides rounded, but the curves are suddenly interrupted in front, so that the anterior constriction is great or considerable; the golden clothing is fairly evenly distributed, but the bottom of the anterior fovea is often bare. Elytra usually with a conspicuous black or dark area on each side about the middle, but in one specimen the black is much more extensive, leaving only the basal margin and some spots on the apical third pale. They are prettily variegated in pattern, owing, in general, to the absence of the golden clothing from the darker parts. The short pale erect setae are very sparse and not conspicuous, chiefly noticeable at the sides and on the apical portion. The surface of the elytra is more or less uneven, some parts being slightly raised. This is especially noticeable on the pale spots which form a transverse (often broken) band on the posterior third, these being evidently raised. There is often a vague oblique ridge behind the shoulders and traces of other inequalities of surface. The humeral angles are distinct and generally subacute or subrectangular, the elytral punctures coarse.

It may be noted that there is usually a fine median longitudinal carina on the rostrum, but it is sometimes only visible in certain aspects and sometimes, perhaps, wanting. Length, male and female, 1.75-2.25 mm.

Hab. Oahu, Mt. Kaala (Sept. 7, 1913, and July 9, 1916); on *Broussaisia*, the larvae are miners in the leaves (O. H. Swezey). Described from 11 examples.

Proterhinus phyllobius n. sp.

This species is allied to the preceding, the female having only a short beak like that of the male, and lacking the usual characteristics of this organ as exhibited by the females of all other species. The color is very variable between entirely black and entirely red, except for a dark area

on each side of the elytra. The legs and antennae are always red, though 2 or 3 of the apical joints of the latter are sometimes somewhat infuscated.

It differs from the preceding in the elytra being narrower, without the uneven surface described above, in their different clothing which is much less developed, so that these generally appear nearly bare and shining except for minute setae, and the pronotum also is much less closely covered. This species would be difficult to distinguish from worn examples of various other more obscure members of the genus, were it not for the similarity of the rostrum in both sexes, so that while it never resembles the female of any other species, it differs from most males by the greater length or more definite character of this organ. Length, male and female, 1.6-2 mm.

This species is mainly described from a series of 13 examples given me by Mr. Swezey some years ago, which were cleaned and mounted by me when newly captured. Others taken with these were dissected at the same time. In addition to these, I have used well-mounted examples taken casually at an earlier date without note of food-plant, these having remained unnamed, as being doubtfully distinct from some described species. I have more superficially examined a series of 30 examples mounted on points and collected by Mr. J. C. Bridwell.

Hab. Oahu, in the mountains near Honolulu. This species was found by Mr. Swezey to have the abnormal habit of mining the leaves of *Broussaisia*. Mr. Bridwell's examples were collected on Kaumuahona, July 23, 1916.

Proterhinus fuscicolor n. sp.

A dark pitchy brown or pitchy black species, the pronotum generally, the head often and sometimes the base of the elytra with an obscure red tint. An elongate species of the group of *ferrugineus epitretus* and *detritus*, but very distinct by its sordid color.

Antennae appearing rather short compared with the length of the whole insect, between two-thirds and three-fourths the length of the elytra, red, the club joints often appearing more or less dark. Rostrum of the male shorter along the sides than the width, of the female elongate, not polished but rugulose, so that the punctate grooved lines are obscured, or more or less effaced. Pronotum narrow compared with the elytra, conspicuously and definitely narrowed in front, the golden clothing not dense, so that the rough sculpture is easily seen, the sides

with outstanding curved setae quite conspicuous; the posterior foveae or impressions sometimes indistinct, sometimes entirely wanting.

Elytra long, sparsely clothed, so that the coarse close punctures are easily seen, the clothing consisting of very minute setae, and of longer erect pallid ones, these also being short. Humeral angles distinct and produced, the tubercles at the base, on each side of the scutellar region, are very little developed, but their position is rendered evident by a condensation of clothing on their surface, forming a pair of small but noticeable spots, distinct from the general vestiture. The femora, and tibiae may be either red or dark. The basal abdominal segment is distinctly punctate on the disc, microscopically sculptured between the punctures. Length, male and female, 2.5-3.5 mm.

Hab. Maui, Haleakala (August 29, 1918, Swezey); described from 26 of the 27 examples captured on the dead leaves at the bases of the rare and very local Composite plant, *Argyroxiphium virescens*, growing in a small canyon a little above Puu Nianiau.

Proterhinus cuneatus n. sp.

Head and thorax obscure red, with golden clothing, the elytra red with the covering whitish, this being nearly uniform except on the black spots, which are bare and situated mostly near the middle of the wing-cases. The elytra are widest at the base, the sides almost straightly converging from the shoulders.

Most like *P. molokaiensis*, probably an even rather larger species, with long antennae, but at the same time the elongate funicle joints are much stouter than is usual in the genus and rather resemble those of the species just named.

Eyes large and very convex, the head strongly constricted behind them, so that a strong ridge is formed there, though less evident in the middle. Scape of antennae long and robustly subtriangular, the second joint elongate, as long as the fourth and much stouter, all the funicle joints elongate, the seventh antennal joint being twice as long as its apical width and the eighth very much longer than wide. The rounded sides of the pronotum are set with quite conspicuous curved setae and very greatly narrowed anteriorly; the anterior impression is very large and though deep is vague, the posterior pair are roundish, very deep and distinct. Humeral angles of the elytra very strongly produced, the tubercles on either side of the scutellum also produced, but less strongly, and bearing a spot formed by whitish setae; the punctures are deep but not at all dense on the basal portion of the elytra. The erect setae are white, long and slender, very conspicuous, being more numerous than usual. Femora dark, the tibiae red, tarsal lobes not large for the size of the insect. Length, male, 4.5 mm.

Hab. Maui, Haleakala, about 4000 feet. I have seen only one example, the type, in my own collection. It was collected many years ago and is in beautiful condition. Apart from the structure of the head and important differences in the antennae, the specimen greatly resembles some examples of my series of *P. molokaiensis*.

Proterhinus malespretus n. sp.

Black or blackish fuscous, a small basal and apical portion of the elytra seem to be red, when closely examined, but the color variation is unknown, as the specimen (male) is unique; the squamous covering is golden. Antennae red, the more apical joints appearing black or almost so.

Eyes fairly large, but not at all strongly convex or prominent as compared with many species, the head not constricted so as to form a transverse ridge. Antennae in no way remarkable, the funicle joints are more or less elongate, the apical ones not at all moniliform; the fifth antennal joint notably longer than the sixth. Pronotum nearly round in outline, with the three impressions distinct, the clothing nearly evenly distributed, but with a small whiter patch just in front of each of the posterior foveae. Elytra arcuately emarginate at the base, so that the humeral angles are very distinct or subacute; at the base in the middle (as is easily seen in lateral aspect) they rise up in a strongly convex or oblique manner for a short distance, when the suture becomes slightly raised or prominent. The golden squamosity is distributed over most of the surface and the white elongate, erect setae, though not very numerous, are extremely conspicuous; the punctures on the median portion are not close. The form of the elytra is somewhat short, the base being wide. Length, male, 2.25 mm.

This species appears to me to be quite distinct. Superficially it resembles some examples of *P. squamicollis* as nearly as any Oahuan species, but it may be more closely allied to the *restitus, robustus* group.

Hab. Oahu, Waianae Mts.; a single male (the type) was collected by me in the winter months (probably January) of 1903 and has been set aside as new in my collection for many years.

Proterhinus longisetis n. sp.

Only a single female of this species has been examined. The head is black, the pronotum obscurely red, being very much suffused with

black, the elytra except for dark spots, the tibiae and more than the basal half of the antennae distinctly red. Squamosity of head and pronotum golden, the latter with large and dense lateral patches of whiter color. Elytra partly abraded, apparently with golden clothing, but with a broadish white stripe extending back from each shoulder to the apex, and with the white erect setae very slender, long and conspicuous on the posterior part. The setae of the hind tibiae are also slender and elongate, but not so long as the longest of those on the elytra. Rostrum shining, with the punctate lines very fine, the head simple without transverse constriction behind the eyes. Antennae rather long, slender, funicle joints all more or less elongate, not at all moniliform. Pronotum strongly rounded at the sides, much narrowed in front and deeply impressed there, the posterior impressions wanting or at least very feeble. No erect fine setae on the pronotum such as are seen in *P. leptothrix*. Elytra almost simply convex, very slightly emarginate at the base, but with distinct humeral angles, which are practically rectangles, the sides are slightly rounded so as to be a little wider about the middle than at the base, but even at the widest part they hardly exceed the pronotum (at its middle) in width. Length, female, *vix* 3 mm.

HAB. Oahu; a single female taken by me in the part of the Koolau Range that is connected with the Waianae Mts. by an elevated plateau. The fine elytral setae remind one of *P. leptothrix*, but that species cannot be at all closely allied.

Proterhinus ater n. sp.

A black or almost black species, with long dark, almost unicolorous antennae, the scape large and unusually long in the male, almost like that of the female. Clothing golden, the elytra largely bare and black, the squamosity forming maculations. Belongs to the species with simple humeral angles and is allied to the variable *P. similis*.

Eyes not at all large, rostrum of female polished and with the grooves distinct. Scape thick and long, rather stouter in the male, but about equal in length to that of the female; second joint longer than wide and stouter than the following ones, which are all elongate, the antennae after the two basal joints, have an unusually slender appearance. The length of one of them in the male is just about equal to that of the elytra. The anterior impression of the pronotum is always present, but the posterior pair are very faint or not noticeable at all in dorsal aspect. The squamosity forms a dense patch on each side of the pronotum. Lobate joint of the front tarsi distinctly small. Elytra of quite simple form, often noticeably flattened or subdepressed on the dorsum, the pale erect setae very conspicuous on the posterior part and in quite unabraded examples with a regular row of almost similar ones

along the whole sides. Front and hind femore extremely stout. Length, male and female, 2.5-3 mm.

This species comes rather close to some extreme forms of the Kau examples of *P. similis*, and I am not sure that in the past I have not actually taken it, or a very closely allied form, in that district, but probably these were referred by me to *similis*. At the present moment I am only able to put my hand on one specimen of this extreme form that approaches *ater*, and it is easily distinguished by the shorter scape (male). Its color is red to a large extent, but probably it would vary to black, so that no importance can be attached to this.

Hab. Kona, Hawaii, 3000 feet. I have in my collection half a dozen very good specimens of this species and one of the males is taken as the type.

The following species sent in this consignment are, in my opinion, the same as ones previously described by me:

Proterhinus vestitus Sharp.

Five examples of this polyphagous species from *Ipomoea bona-nox*, taken by Mr. J. C. Bridwell. It breeds in *Aleurites*, *Pisonia*, *Charpentiera*, *Pipturus*, *Dracaena*, etc. One batch of specimens which I bred from *Pipturus*, though fully mature, remained entirely red with no black markings, but usually the examples from *Pipturus* are quite like those from other trees or plants.

Proterhinus subangularis Perkins.

Twelve examples of this common and widely distributed species were taken at Punahou, Oahu, by Mr. Bridwell on *Straussia*. It is very doubtful whether *subangularis* and *obscuricolor* are distinct species, or even worthy of varietal names; *angularis* and *deplanatus*, at any rate in the typical form, seem more distinct, but their specific value is dubious. All are attached to *Straussia*, almost if not quite exclusively. Some colonies of each of these forms are fairly constant, others yield very aberrant examples amongst the normal ones.

Proterhinus antiquus Perkins.

A single example taken by Mr. Swezey on Mt. Kaala in company with *P. abnormis*, described above. It is in poor condition, but I have several from Kaala that are much better in this respect, one being very fresh. I cannot separate these from some specimens of the Kauai *antiquus*. The individuals captured by me were taken casually, but certainly not on *Broussaisia*. There is also a closely allied and apparently new species in the Koolau Range, but I should like to see more examples than those I have collected.

Proterhinus deceptor Perkins.

Two small and fresh examples; one taken by Mr. Bridwell on the coral plain at Ewa from *Euphorbia*, and one taken by Mr. Timberlake on Diamond Head from *Lipochaeta*, agree excellently with minute examples of a large series bred by myself from *Gossypium*. In the latter series were examples twice or thrice the size of the smallest ones. Other series have been obtained from the hau and various other trees.

Fourteen examples from Kilauea, Hawaii, found by Mr. Swezey on the rare tree *Hibiscadelphus Giffardianus* belong to the form var. *major* (hardly to be separated from var. *kauaiensis*). They differ much in size and somewhat in other respects from the minute examples mentioned above, but with series from different islands and taken from different plants I am unable to split up the species.

Proterhinus excrucians Perkins.

An example of the smaller, narrower variety of this most difficult and variable species is in poor condition. It was captured on the lowlands (on the Ewa coral plain), on *Sida* by Mr. Bridwell, and differs in no wise from some of the depauperated examples taken in the mountain forest above Honolulu.

Proterhinus obscurus Sharp.

A male of the darkest variety of this variable species was

captured by Mr. Swezey on *Pritchardia*, Mt. Olympus, Oahu. It is well known to be polyphagous. Several other specimens were taken by him from *Euphorbia* in Manoa Valley. These are of the paler form, and hardly differ from slightly faded examples of var. *chryseis*. One of the males is much larger than the other. I have great doubt whether *P. minimus* is more than a depauperated form of this same species.

NOTES AND EXHIBITIONS.

Cleрid beetle.—Mr. Pemberton exhibited specimens of a species of Cleridae taken by him on dead wood of Monkey-pod tree (*Samanea saman*) brought to the Experiment Station, H. S. P. A., from their forestry nursery near Vineyard Street and Nuuanu. The species is apparently a previously unrecorded immigrant.

Bostrychid beetle.—Mr. Bridwell exhibited specimens of an undetermined Bostrychid taken from a packing case in which cigars had been imported from Manila. The species does not seem to have become established. Mr. Ehrhorn recalled taking a beetle under similar conditions, and examination of specimens showed this to be the same species. The box was made of a native Philippine wood which Mr. J. F. Rock considered as probably a species of tropical cedar. A general discussion of the introduction of insects in commerce other than those articles subject to plant quarantine inspection followed.

Celerio sp.*—Mr. Bryan exhibited a specimen of an undescribed endemic species of the Sphingid genus *Celerio* taken by him on the ascent from Manoa Valley to Panoa Flats, Oahu, October 5th, 1919. The only specimens of this species heretofore known are a very much rubbed specimen taken by Mr. Swezey at Palolo Crater, September 3rd, 1906, and another very much deformed specimen bred by Mr. Swezey

*Described on page 370 as *Celerio perkinsi*. (Ed.)

from a caterpillar on *Straussia* from Mt. Tantalus, Oahu, January 16th, 1916.

Eristalis aeneus.—Mr. Bryan gave notes on the bibliography of this fly, and a general discussion of its extreme abundance followed. This muck-breeding fly is now conspicuous by its entrance into houses, particularly in the lower Manoa, Punahou and Kalihi districts of Honolulu, and is also found abundant on the Ewa Coral Plain. None of the members had found its breeding places and none could suggest any type of breeding place which would account for its general abundance. Mr. Timberlake suggested that on account of its strong powers of flight it might be distributing itself from some centralized breeding places. Mr. Bridwell suggested that from the known breeding places of its allies, *Volucella obesa* and *Eristalis punctulatus*, it is probably breeding in the pineapple refuse at the canneries in Iwilei and in the sisal refuse at the sisal mill.

Xyleborus spp.—Mr. Bridwell exhibited series of both sexes of three species of Scolytidae belonging to or related to *Xyleborus*. These are all ambrosia beetles, the burrowing being done by the adult beetles while the larvae feed upon a fungous growth in the tunnels. One of the species exhibited was from the wiliwili tree (*Erythrina monosperma*) on the Ewa Coral Plain; another was taken from the branches of *Dracaena aurea* in Nuuanu; and the third was working in ohia ha (*Syzygium sandwicense*). Other species are known to attack *Acacia koa*, *Bobea*, *Straussia*, *Perrottetia*, and other native trees, and it is probable that when the group is thoroly collected that many species will be added to the few which have been described.

Odynerus pseudochromus.—Mr. Bridwell exhibited specimens of what he considered an undescribed variety of this species of wasp, recently bred by him from Nuuanu Valley. The female has round red spots on the second tergite and

irregular ones on the angles of the propodeum, while the male has the clypeus encircled with a reddish yellow margin.

Plagithmysine in Syzygium sandwicense.—Mr. Bridwell exhibited living larvae of a Plagithmysine Cerambycid found working in the dead bark of *Syzygium sandwicense* above the eastern waterfall at the head of Manoa Valley, and reported finding larvae of the same group in the living bark of *Bobea* and *Pittosporum*. *Callithmysus hirtipes* which has recently been bred by Mr. Swezey from *Perrottetia* has been recorded as breeding in *Bobea*, while the other species of trees mentioned have no species of Plagithmysini recorded as attached to them on the Island of Oahu.

Scleroderma spp.—Mr. Bridwell gave further notes on the habits and variations of some species of *Scleroderma*.

New Immigrant Chrysopid.—Mr. Timberlake reported the presence of a second immigrant *Chrysopa* on Oahu, commonly coming to light. The adult does not feed upon plant-lice but eats honeydew freely. The species is similar to the American *Chrysopa externa* Hagen.

The ginger weevil, *Pteroporus subtruncatus*

Ginger weevil.—Mr. Swezey reported having received the determination of the ginger weevil from Dr. Guy A. K. Marshall of the Imperial Bureau of Entomology. Specimens had been sent to him by Mr. Muir. The species is *Pteroporus sub-*

truncatus Fairmaire, described from Fiji in Ann. Soc. Ent. France, 1881, p. 308.

Nesencyrtus kauiae.—Mr. Timberlake exhibited specimens of this Encyrtid, reared from the pupa of a *Nesoprosopis,* and collected in *Nesoprosopis* nests in rotten logs in Nuuanu Valley by Mr. Bridwell. The host is one of the smaller bees of this genus and probably *N. koae.*

DECEMBER 4th, 1919.

The 171st meeting of the Society was held in the usual place, President Giffard in the chair. Other members present: Messrs. Bridwell, Bryan, Crawford, Ehrhorn, Fullaway, Osborn, Pemberton, Potter, Rosa, Swezey, Timberlake, Willard and Williams.

Minutes of previous meeting read and approved.

The President read a communication from the Secretary of the Hawaiian Sugar Planters' Association advising of a contribution of $650., $150. to cover publishing deficit of 1919, and $500. for publishing fund for 1920. The latter amount to be considered an annual contribution for the future. A unanimous vote of thanks was voted to be communicated to the Planters' Association, and also to the President of the Society for his efforts towards securing this contribution.

The Treasurer's Report for 1919 showed a balance of $120.12.

Election of Officers for 1920:

President	D. L. Crawford
Vice-President	F. X. Williams
Secretary-Treasurer	D. T. Fullaway

Additional members of Executive Committee

W. M. Giffard
O. H. Swezey

PRESIDENTIAL ADDRESS.

A Review of the Organization of the Hawaiian Entomological Society and Brief Mention of Some of the More Notable Achievements in Hawaii by Its Members.

BY WALTER M. GIFFARD.

On this, the fifteenth, anniversary of the Hawaiian Entomological Society, it is fitting that the presidential address should be largely devoted to a review of the organization and to the significance of what has been done since the beginning. It is also appropriate that we should recall the objects which led to the formation of the society, and that we should review some of the more notable achievements by the pioneers in this field of labor in Hawaii, and by others who joined later to lend their energy and ability to the advancement of an all-important work.

It has been said, and with truth, that Hawaii has, in numerous instances, acquainted the world with new and valuable facts in the inexhaustible mines of entomological research, for these remote islands have been the laboratory of a remarkable series of intensely interesting and highly profitable experiments in the introduction of beneficial insects. When these successful tests, often fulfilled only after long and patient scientific field research, and at much expense, are considered in the aggregate, it is evident that Hawaii holds a most enviable record, and that the progress and practical results obtained by the entomologists in these islands more than equal anything of the kind that has so far been recorded from any other part of the world. The saving in money, to Hawaii's principal industry, cane sugar, is well nigh incalculable. Nor, heretofore at least, have Hawaii's entomologists ever taken the trouble to sound their own trumpets with regard to their achievements. Visiting scientists have remarked that, in their opinion, we are altogether too modest when we have something worth while boasting about. Hawaiian entomologists, it has

been remarked, have been inclined to confine their printed intelligence to the bare if not simple facts of technical description, avoiding what, in some fields of endeavor, would be a tendency to blare their triumphs to the world at large.

Three separate official staffs of entomologists were maintained in these islands at the time of the organization of the Hawaiian Entomological Society, the oldest of these staffs being the entomological division of the territorial Board of Agriculture and Forestry, which, as a matter of fact, dates back to 1893, in the days of the Provisional Government, when Mr. Albert Koebele was engaged by the administration to introduce lady-birds and other beneficial insects to prey on cottony-cushion and other injurious scales then existent in the islands, particularly in Honolulu.

It was in the early part of 1903, ten years later, that the territorial government organized the present Board of Agriculture and Forestry, its entomological division being made to include Albert Koebele, who was appointed to be superintendent, and Dr. R. C. L. Perkins, as assistant superintendent. Shortly afterwards, the late Messrs. G. W. Kirkaldy and F. W. Terry were added to the staff. As Superintendent Koebele was away on a search for beneficial insects, Doctor Perkins was in reality the head of the entomological organization, the work of which, more particularly, included the inspection, under new regulations, of all imported vegetable matter, the idea being to prevent, so far as possible, any further introduction of insect pests by way of the port of Honolulu.

As older members of this society will recall, Doctor Perkins and Messrs. Kirkaldy and Terry were appointed to the Board of Agriculture and Forestry under an arrangement with and mostly at the expense of the Hawaiian Sugar Planters' Association, and under this agreement much of their time was devoted to the study of insect pests affecting sugar cane, and to the search for and the introduction of beneficial insects to combat such pests. Due to the then recent ravages of the sugar cane leaf-hopper in all cane-fields throughout the islands, the

task set these scientists was not without many difficulties, and it was deemed essential to the successful conduct of the campaign against sugar-cane pests that the Sugar Planters' Association should establish and control its own entomological division, separate and independent of the entomological division of the territorial Board of Agriculture and Forestry. Therefore, assuming the whole expense, the Hawaiian Sugar Planters' Association, with the official co-operation of the Board of Agriculture and Forestry, assigned Messrs. Koebele and Perkins to undertake a search abroad for some effective enemy to prey on the cane leaf-hopper. Messrs. Kirkaldy and Terry remained with the Board of Agriculture and Forestry until the reorganization of the Sugar Planters' Experiment Station was complete, after which the late Mr. Alexander Craw was appointed to the Board of Agriculture and Forestry, as entomologist, to fill the position of superintendent in place of Mr. Koebele.

During the latter part of 1904, the Sugar Planters concluded the reorganization of their experiment station, adding thereto a division of entomology, taking over as members of the staff the entomologists above named, with the exception of Mr. Craw, who remained as superintendent of entomology with the Board of Agriculture and Forestry, and Mr. Jacob Kotinsky, a later appointee, who acted as assistant on the staff of the board, both of these gentlemen confining their work, in the main, to the inspection of imported plants and other vegetable matter, and to entomological inspection work around the city of Honolulu. At the same time, Mr. O. H. Swezey was specially engaged to assist in breeding parasites and in plantation inspection work, and Mr. Frederick Muir was engaged to continue further foreign entomological exploration on much the same lines as had been followed by Messrs. Perkins and Koebele.

In the meantime, the federal government, through the Bureau of Agriculture at Washington, had already established an agricultural station for the purpose of experimenting with and aiding diversified agricultural industries other than sugar cane,

and on its staff was an entomologist, Mr. D. L. Van Dine, who rendered valuable assistance to the small farmer in coping with fruit insect pests, and in aiding the local health authorities in mosquito control by the introduction of the top-minnows now so abundant and widely spread in our ponds and marshes.

So it will be seen that there were three separate staffs of entomologists in Honolulu—the staff of the Federal Experiment Station, the staff of the Planters' Association, and the staff of the Board of Agriculture and Forestry. Under the circumstances, it would not be remarkable if a certain amount of duplicating or overlapping should occur in entomological work, with the prospect of considerable waste of energy and time in future research, and for that reason, and because of the general interest taken in Hawaii's indigenous insect fauna, and the insect fauna of other countries which might be closely allied thereto, it appeared advisable that a society of entomologists be formed for the purpose of interchanging views on entomological subjects, to promote and encourage friendly relations among all who might in any way be interested in this particular science, and to engender the spirit of co-operation and co-ordination, in so far as was possible, among all the workers in Hawaii; and in the forming of this society all of the scientists above named became prominent pioneers.

When the society was organized, in December, 1904, it was practically understood, as now, that insects already in the Territory, and those from foreign countries closely allied thereto, whether of a beneficial or an injurious nature, should constitute the dominant feature of papers and discussions presented, or made the subjects of consideration at meetings of the society.

There were fifteen members at the time of organization, namely, R. C. L. Perkins, G. W. Kirkaldy, F. W. Terry, J. Kotinsky, O. H. Swezey, A. Koebele, Alexander Craw, W. M. Giffard, W. A. Bryan, D. L Van Dine, R. S. Hosmer, C. F. Eckart, C. J. Austin, Brother Matthias Newell, and Mrs. O. H. Swezey. Of this number eight were entomologists who were actively engaged in professional work in the Territory, while

the others were interested in entomological work or allied scientific pursuits. Subsequently, Brother Matthias Newell and A. Koebele were elected honorary members. In 1909 this honorary membership list was increased to five by the addition of Dr. R. C. L. Perkins, Dr. David Sharp, and the Rev. Thomas Blackburn. Mr. Blackburn had been identified with our indigenous insect fauna in previous years, having been a resident of Honolulu from 1876 to 1882, during which period, in his leisure hours, he devoted much time exploring the forest regions in the vicinity of Honolulu, collecting and studying endemic insects, and later describing many of these. This pioneer work of Mr. Blackburn later led to the systematic scientific exploration of these islands by Dr. R. C. L. Perkins, engaged for the purpose, and the publication of the "Fauna Hawaiiensis" by a joint committee appointed by the Royal Society of London, and the British Association for the Advancement of Science. The Bishop Museum, of Honolulu, also rendered valuable assistance in making the publication possible.

Dr. David Sharp, a noted British entomologist, also had done pioneer work in connection with our indigenous insect fauna, having published his first paper in connection therewith as far back as 1878, and had since then contributed and edited many very valuable papers included in the "Fauna Hawaiiensis".

Within a year of the organization of the Hawaiian Entomological Society, the membership had increased from fifteen to twenty, without any solicitation on the part of original members, and from time to time there have been additions, as, at times, there have been deaths and resignations, so that, at this time the society has a membership of twenty-nine, and a dozen members are actively engaged in various branches of entomology.

The first and many of the subsequent meetings of this society took place in the library of the Board of Agriculture and Forestry, and it was there that the small band of enthusiastic entomological workers gathered to discuss and complete

organization, laying the foundation of what has developed into an institution peculiarly serviceable and desirable for the interchange of views, for important discussions, and for the presentation of valuable entomological information, bearing on local matters as well as matters of foreign import but related to Hawaiian entomological interests, all of which has gradually perfected a spirit of harmonious co-operation and co-ordination along certain lines of systematic research and labor, which, otherwise, might never have been possible.

The Hawaiian Entomological Society is not only to be congratulated on the harmonious relations which have always existed among the active members, but it is to be most heartily congratulated because of the important and far-reaching results which have been achieved by many of the men who have been most actively engaged as members of this society.

Working in their official capacities, members of this society have, during the fifteen years of the organization, scored numerous entomological achievements of far-reaching economic importance. One of the principal reasons for so much entomological work having been undertaken may be found in the fact that the ravages of the hopper on sugar cane, from 1902 to 1904, called for strenuous and continuous action. One might say that the society owes its existence to the leaf-hopper. To this cause, and the fear of further introductions of insect pests, and the paramount necessity of inspection and the control of all importations of plants and other vegetable matter, must also be attributed the formal organization of the Board of Agriculture and Forestry and its various divisions, including that of entomology. The excellent results accomplished in the work of controlling the cane leaf-hopper by the practical use of its natural enemies are too well known by the members of this society, and others, to require any detailed review in an address of this nature. The immense monetary saving to the sugar plantations during 1905 and 1906, and in the years following, has won the appreciative acknowledgment of the

sugar planters, than which there could be no more eloquent testimony to the success of our entomologists.

In 1906 Mr. Muir undertook an exploration in search of a parasite on the sugar-cane borer. He discovered one in 1908, introducing it in Hawaii two years later. Such was the success in breeding and establishing this parasite that the cane-borer pest has decreased to a very considerable extent, the sugar yield on affected plantations greatly increasing, and the losses, which for years had been large, have been minimized. Practically the same procedure was observed with reference to the Anomala beetle, which was affecting some Oahu plantations, the importation of a predatory wasp having so far controlled the situation.

There are many other achievements in economic entomology in which prominent active members of our society might be mentioned. There are the introductions, by Professor F. Sylvestri, D. T. Fullaway and J. C. Bridwell, of fruit-fly parasites from Africa and India. In 1913 it was very difficult to secure Hawaiian-grown fruit and cucurbits that were not affected by the fruit-fly, but now we are enabled to enjoy a good percentage of these. Mr. H. T. Osborn discovered a parasite on the corn leaf-hopper, in the Philippines, which was introduced into Hawaii and bred and distributed by D. T. Fullaway. This pest is now being very effectively reduced. Many parasites on scale and other insect pests affecting agriculture and horticulture have been searched for, discovered, and introduced into Hawaii by many members of our society in their several official capacities. Many of these beneficial insects have proven of appreciable value to the Territory as a whole.

In a general way the society has derived much benefit from the work of all our active members and has frequently enjoyed the advantage of many valuable papers and observations contributed by them from time to time. These papers have been, in most part, on subjects of our endemic insect fauna, and quite naturally so, as the studies and life histories

of the native insects of Hawaii have to most of our members formed a great part of their relaxation from the duties of official routine, and in addition thereto are one of the chief purposes of the organization of our society.

Thus it will be seen that during the past fifteen years our members, while engaged in their official duties, or otherwise, have performed notable work and have accomplished results that reflect great credit to themselves, to the society, and to the organizations by which they are employed. These islands, and the organizations involved, have been and are now fortunate in having such efficient workers.

It would be impossible to estimate the full measure of good, to our members and to entomology in Hawaii, that has grown out of the friendly co-operation, the earnest fraternizing for discussion and consultation, and, occasionally, the enthusiastic parties made up for excursions into the forests in quest of specimens of native insect life. Much of this is welcome relaxation from the often tiresome routine of daily official duties. In this manner our society has contributed toward the very friendly feeling, one for another, that characterizes its membership.

A few statistics will assist in conveying some idea of what the society has been doing. Since the time of its organization, fifteen years ago, 171 regular meetings have been held, and, up to the end of 1918, members have contributed 221 technical papers, covering 1113 printed pages, dealing altogether or in part with allied Hawaiian and foreign entomological subjects. These are to be found in the volumes of the society's proceedings. We are now entering upon the publication of the second part of Volume IV, the volumes as a whole having covered 1262 pages of print, exclusive of the illustrations.

It is also interesting to note, in this connection, that our association is the only entomological society this side of the Rocky Mountains that regularly publishes proceedings and descriptive matter.

Four of our most respected and most active members have

passed away from mortal associations, but their work remains. Their valuable contributions of papers to this organization remain as monuments to their memory. Though departed from these visible fields of research in which we labor, their services to the enrichment of science will ever be of benefit to those engaged in entomological study, and their accomplishments will remain fresh not only in the minds of those who worked here with them, and in the thoughts of their associates, but they will also shine in the annals of scientific history. I refer to Messrs. Kirkaldy, Terry, Craw and Blackburn.

For the past few years ill-health has deprived us of the presence of Doctor Perkins, whose knowledge of Hawaii's indigenous insect fauna was of paramount assistance to many of our members specializing along this line. Albert Koebele has also been obliged to leave us because of failing health, and his genial presence and hearty co-operation have been greatly missed.

In concluding this address, I feel moved to say a word concerning the future. If we may build our expectations of what is to come, on our experiences and accomplishments of the fifteen years of our progressive existence as an organization, we may go forward with confidence and every encouragement. But we must not forget that, in order to maintain our good record, and in order to attain to still greater achievements, we must never lose sight of the chief essential to the success of any society, and that is earnest co-operation. For example, all duplication and over-lapping of work among the members should be carefully avoided. Sometimes this cannot be helped, but if we agree among ourselves that the families or groups of insects to be studied shall not be taken up by two men at the same time, we shall save much valuable time, energy and patience.

I would like to suggest that more illustrations or figures accompany the papers contributed to this society. Not so many, of course, as would make it financially impossible to publish them all, but enough to facilitate the reader's ready

grasp of the subject-matter. A timely figure frequently conveys to some minds at a glance what would require several minutes to be conveyed by means of words. Also, let us remember to continue to assist one another with material for study, whenever opportunity offers. Constantly one is coming across material for which one may not have immediate use, but which may prove most welcome to some other who has, perhaps, been looking for that very material.

It was but a generation ago that very little scientific ambition was exhibited in the agricultural world, but once curiosity and enthusiasm were aroused by pioneers in research work, and it gradually came to be realized that vast fortunes could be saved through the development and application of knowledge, economic entomology began to take long strides, until, when the Hawaiian Entomological Society was organized, this science was beginning to surprise the world with its successive wonders, and, as already intimated, Hawaii, since her needs were urgent and her promoters were men of resource and imagination, welcomed the immense benefit, sparing neither time nor expense to free herself of insect pests.

At this point it is not inappropriate to remark that the financial assistance of the Hawaiian Sugar Planters' Association has played no small part in the success of our society, a fact that is thoroughly appreciated by this organization, and the Planters' Association, I am sure, has our most sincere thanks.

There is an immense interest in economic entomology in these busy days of rapid scientific advancement along all lines of human endeavor. Hawaii will do her part in the future, as she has done her part in the past. The world is forging ahead, and, at the same time, impatiently clamoring for solutions to a host of problems—social, economic and industrial. As marvelous as have been achievements in the realm of economic entomology, still greater problems invite solution, and already we may be on the threshold of some startling discoveries. Trained intellects are today more in demand than ever before,

and I am sure you will agree with me when I say that truly effective entomological work demands minds very carefully prepared along particular lines. Yes, there are greater developments close ahead of all workers in entomology, and, without bragging for the Hawaiian Entomological Society, I feel confident that Hawaii will continue to maintain her most creditable position in the scientific race, and that her entomologists will not fail to secure their share of the honors in whatever advancement is recorded.

There are still many entomological problems of importance facing Hawaii today which can only be solved by the most careful study and patient scientific research. The purpose of this address is not to go into detail as to such problems, but they are well known to our most active members. It suffices to say that the solution of one or more of any of these by our entomologists cannot but bring additional credit to them, to the Society and benefit to the Territory. The Society also continues to feel the necessity of further research and biological work in connection with our endemic insect fauna, and whilst considerable has been done on these lines in past years by our members, there still remains much left undone and a part of which it is hoped will be undertaken in the near future.

I very much regret that I have been prevented by illness, and by absence from the Territory, from presiding more often at our meetings during the past year, and I want to take this opportunity to express my thanks to Vice-President D. L. Crawford for taking my place and assuming the duties of the office, whenever it was necessary during that period. These same circumstances have compelled me to very hurriedly and, perhaps, somewhat disconnectedly, deal with the present subject as the presidential address for the year, and I therefore ask the kind indulgence of the members because of any important omissions I may have made.

PAPERS.

Cerotrioza (Psyllidae, Homoptera).

BY D. L. CRAWFORD.

In a previous paper on Hawaiian Psyllidae[1] the genus *Cerotrioza* was erected for one species apparently native on the island of Oahu. There were referred to this same genus two species from the South Pacific which seemed to be related to the Hawaiian species. Examination of additional specimens representing the same as well as new species both from Hawaii and the South Pacific has convinced me that a change must be made in this genus.

Cerotrioza should be a little more restricted to include two Hawaiian species (one new and described below), while the South Pacific species should be referred to the genus *Leuronota* Crawford[2] already established and embracing several species from various parts of the world.

CEROTRIOZA redefined—Vertex as long as broad or longer, produced in front into two rounded epiphyses extending over and often beyond insertion of antennae; genae slightly swollen around insertion of antennae but not produced into conical processes. Remainder of original definition valid.

This genus in Hawaii is apparently a derivative of some species of *Leuronota*, for the two genera are similar in the elongate, unarched body and elongate wings with similar venation but differ in the structure of the head:—

Cerotrioza—Genal cones wanting; vertex longer than broad or at least as long as broad, produced in front into two large epiphyses.

Leuronota—Genal cones present, porrect, half or fully as long as vertex; vertex not as long as broad, sometimes produced into two small epiphyses close to front ocellus.

The following species have been or are now referred to the genus *Leuronota*:—

L. maculata Crawford[3]—Southwestern United States.

L. acutipennis Crawford[3]—Nicaragua.

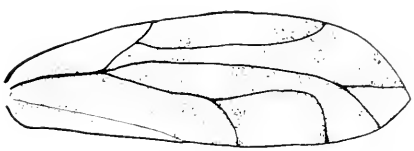
L. longipennis Crawford[3]—Florida.

1 Proc. Haw'n. Ent. Soc. III, No. 5, p. 454, April, 1918.
2 United States Nat. Mus. Bul. 85:67, 1914.
3 United States Nat. Mus. Bul. 85:67-70, 1914.

L. minuta Crawford[4]—Bengal, India.
L. corniger Crawford[5]—Singapore.
L. microceras Crawford[5]—Borneo.

Cerotrioza bridwelli n. sp.

Similar to *C. bivittata* Crawford but differing as follows. Vertex about as long as broad, discally impressed deeply on each side of median suture. Lateral vitta wanting or scarcely discernible; color fulvous.



Cerotrioza bridwelli. Forewing; stippled areas are colored brown

Forewings without axial vitta, but irregularly maculated as shown in the accompanying illustration; cubital cell more nearly rectangular than in the other species.

Described from one female taken by J. C. Bridwell at Punahun, Koolau Mountains, Oahu, 1916.

A Note on Apterocyclus (Coleoptera, Lucanidae).

BY H. T. OSBORN.

While collecting for several days in the vicinity of Kokee, Kauai, in June of this year, fifteen presentable specimens of this little-known Kauai genus were obtained. It was after several days of tramping and collecting that I accidentally stumbled onto their location. A new forest trail was in course of construction on the steep slope leading into the Kauaikinana stream at about 3,500 feet elevation and while descending this

[4] Records of Indian Museum, VII, Part 5:433, 1912. Described as *Allotrioza minuta* but must be referred to *Leuronota* as *Allotrioza* is in synonymy.

[5] These two species were placed in *Cerotrioza* in a paper which is in press, to appear in the Philippine Journal of Science, but they are now referred to *Leuronota*.

a broken-up beetle was observed in the path. A closer examination revealed a number of dead and rotting grubs in the newly packed soil. A close watch was then kept while the Japanese dug up some 50 or more yards of new trail. The results so far as obtaining adult beetles were concerned were very meagre, only four being secured alive. The grubs, however, were present in large numbers, certainly not less than 500 of various sizes being turned over. The grubs occurred from two to eight inches beneath the surface in the loose soil about the forest trees, but no definite evidence of feeding was observed.

On June 12th while following the auto road from Halemaumau to Puu Ka Pele, 3,300 feet elevation, I was surprised to notice two live beetles in the dust in the auto tire track. They were lying on their backs and seemed unable to turn over and escape. Close watch was then kept and in a distance of about a mile a number of beetles were found in this same position, though most of them were crushed and worthless. In all, eleven of these found along the road were in good enough shape for preservation.

At Puu Ka Pele in digging with a small hand trowel about the roots of a clump of old Koa trees a half-dozen grubs of *Apterocyclus* were found, while the remains of dead beetles were found in the trash and debris under the trees.

From these few facts it would seem that instead of being rare the beetles of this genus are quite abundant, and furnish an interesting subject for further study. The Puu Ka Pele specimens appear to be a different species from those obtained in the Kauaikinana Valley.

Some New Hawaiian Lepidoptera.

BY O. H. SWEZEY.

During the past five years specimens of new species of moths have been accumulating. These have mostly been reared specimens from caterpillars found in various places, and from

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that reason have the greater interest. I now give descriptions of a number of these that they may go on record. The type specimens are deposited in the collection of the Hawaiian Entomological Society.

Caradrinidae.

Euxoa wikstroemiae n. sp.

♀. Head and thorax pale brownish grey; antennae and palpi of the same color, but the median joint of the palpi dark brown on the outer side except at the apex. Legs nearly uniformly concolorous with the thorax; abdomen concolorous, but paler.

Forewings pale brownish grey; subbasal, first, and second lines paler, but a little darker edged; the first line strongly waved; second line feebly waved, very indistinct; orbicular and reniform partially outlined with pale brown; a median browner shade clear across the wing; two black spots near termen, one on each side of vein 5, the anterior spot the larger. Hindwings nearly uniform pale brownish grey, paler than the forewings; a fuscous discal mark and a terminal series of blackish dots; underside with a distinct dentate post medial line, the discal mark also showing plainer than on upper side. Expanse, 30-40 mm.

Quite distinct from all other endemic Hawaiian species of the genus. Described from 2 ♀♀ reared from two small caterpillars found on a *Wikstroemia* bush at top of west wall of Waimea Canyon, Kauai, at an elevation of about 1500 feet, February 14, 1915 (Swezey). The caterpillars obtained their full-growth and entered soil to pupate March 24th, and the adult moths appeared April 22nd.

Caterpillar. The full-grown caterpillar was 40 mm. in length; nearly uniformly dark fuscous, minutely spotted with paler, whitish on ventral surface; head light ferruginous; cervical shield black with a broad yellow discal patch widest posteriorly, a median white line which extends indistinctly onto the two following segments; setae very short, pale, each in a black dot; anal shield black with several yellow spots; spiracles oval, entirely black.

Pupa. 20 mm. long; yellowish brown, infuscated on dorsum of metathorax and abdomen; a dorsal transverse band of small pits near anterior margin of 5th, 6th, and 7th abdominal

segments; wing-sheaths, antennae-sheaths and posterior leg-sheaths extend to apex of 4th abdominal segment; cremaster with two short diverging spines, thick at base, dark reddish, apical half whitish.

I have found apparently the caterpillars of the same species, but failed to rear them, at the following places on Oahu, and always on *Wikstroemia:* October 25, 1914, on the ridge back of Alewa Heights; April 30, 1916, on Waialae Nui ridge; July 9, 1916, on the east side of Mt. Kaala near the top. The caterpillars are found on their food-plant in the daytime, a different habit from the other species so far as known. Having a tree for food-plant is also an unusual habit for the moths of this kind in Hawaii.

Euxoa kerri n. sp.

♂, ♀. Head and thorax grey, collar with a slight brownish tinge; palpi somewhat sprinkled with fuscous on the outer side; antennae grey, that of male shortly bipectinate for about two-thirds of its length; legs pale grey, tibiae and tarsi marked with fuscous; abdomen pale grey, anal tufts slightly yellowish.

Forewings brownish ochreous to brownish fuscous, the paler portions at base and termen; subbasal, first and second lines whitish, edged with brownish fuscous; first line strongly waved, much bent inwardly on vein 1; second line slightly waved, strongly bent outwardly on vein 1; orbicular oval, brownish outlined, in one specimen (♂) filled with pale ochreous, in the other (♀) partially filled with fuscous; reniform partially brownish outlined, pale ochreous in the male, partially filled with fuscous in the female. Hindwings of male pale grey, the veins somewhat fuscous; of female light fuscous, paler towards the base. Expanse, 38-42 mm.

Described from a male and female reared from two small caterpillars found on plants of *Boerhaavia tetrandra,* collected by Dr. Wm. Kerr of the U.S.S. "Rainbow", on French Frigate Shoals, October, 1914. These caterpillars were fed on *Portulaca oleracea* and grew to maturity, and pupated on January 5th and 14th respectively. The moths appeared on January 20th and February 8th.

Caterpillar. Length when full-grown about 50 mm. It resembles the caterpillar of *Agrotis crinigera* except that the head

is paler, almost entirely pale yellowish testaceous with slender black line along paraclypeal suture where *crinigera* has quite a wide blackish mark. The cervical shield is also paler than that of *crinigera*.

Pupa. Similar to that of *crinigera*; length, 20 mm.

Sphingidae.

Celerio perkinsi n. sp.

Head and thorax olive brown, a lateral stripe on head and margins of patagia whitish to ochreous. Antennae dark fuscous, apex whitish except the very tip, which is fuscous. Palpi concolorous with the head, paler at base. Legs greyish brown. Abdomen nearly black above, with a median streak of the same color as the thorax, the posterior margins of segments with fringe of white scales except in region of the median streak. Thorax and abdomen below ochreous, with faint pinkish tinge. Forewings dark brown, much suffused with greyish and ochreous scales and hairs; lines fuscous brown, first line indistinct except near costa, preceded by a triangular very dark fuscous dorsal patch; median line curved inwardly towards costa and outwardly towards dorsum; second line nearly parallel with median but closer to it dorsally, with outward crenulations between the veins; dark fuscous marks at terminations of the veins; an inwardly oblique short blackish bar at apex; a discal brownish fuscous mark and another at end of cell; a large somewhat triangular brownish patch with its base on dorsum between second line and tornus; cilia dark fuscous at ends of veins, paler between, ochreous towards tornus. Hindwings very dark fuscous or nearly black, with a median band of pink which is nearly obsolete towards costa, wide at anal angle; cilia ochreous. Under side of wings with a pinkish tinge, most intense towards dorsum of each wing. Expanse of wings, 57-65 mm.

Somewhat resembles *wilsoni* in the pattern of the forewings, but differs from that species particularly in the white segmental marks on the abdomen, instead of orange as in *wilsoni*, and the pink band on the hindwing where it is orange in *wilsoni*. It is also of smaller size.

Hab. Palolo Crater, Oahu, Sept. 3, 1906, one specimen collected while at rest on a tree trunk (Swezey); one specimen collected on lower part of Mt. Tantalus at upper part of Manoa Valley, Oahu, Oct. 5, 1919 (Bryan); one specimen reared from a small caterpillar given me by Mr. J. A. Kusche, who found it feeding on leaves of *Straussia*, Mt. Tantalus, Oahu, Oct. 11, 1919. This caterpillar was fed on *Straussia* leaves, and finished its growth by Oct. 25, when it

spun up in moss of the breeding jar. It pupated four days later, and the moth emerged Nov. 19, after three weeks in the pupal stage.

I have named this moth for Dr. Perkins, who was with me when I found the first specimen, and at once recognized it as different from the known species. The specimen, however, was too much battered and abraded for description. This is now made possible by the reared specimen in good condition, and the fairly good specimen collected by Mr. Bryan.

NOTE.—Recently the Bishop Museum has received, by way of exchange, a pair of *Celerio galli intermedia* Kirby from Mr. B. Preston Clark of Boston. These specimens were collected in Alaska. The species is widely distributed in North America.

Comparing these with the Hawaiian *Celerios*, there is a striking similarity in the color patterns of the wings, and the abdominal markings. The similarity is most striking with our *C. calida* (Butler). It seems to me to indicate the American origin of the ancestors of the Hawaiian *Celerios*. Mr. Clark, in letter, also concurs in the belief that the Hawaiian Sphingidae are allied to those of America.

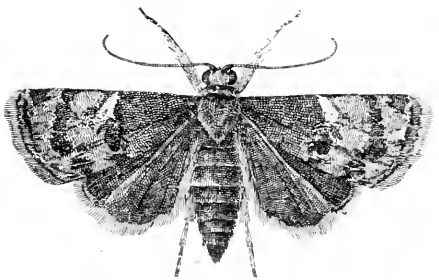
PYRAUSTIDAE.

Mestolobes chrysomolybdoides n. sp.

♀. Head, thorax and abdomen dark leaden-fuscous; palpi light yellow; antennae dark fuscous; legs greyish-fuscous, tarsi whitish ringed. Forewings nearly black, almost completely suffused with shining leaden scales except at first and second lines; first line near middle of wing, slightly curved, black with a short yellow streak in costal half; second line near termen, broad, black, outwardly curved and broader a little beyond middle; cilia to middle of termen white, dark fuscous at base, beyond middle of termen grey, dark fuscous at base. Hindwings dark fuscous-brown, basal half a little paler; cilia white, fuscous-brown at base. Expanse of wings, 12-13 mm.

HAB. Mt. Kaala, Oahu, about 2500 feet elevation, March 4, 1917, two specimens reared from larvae in moss on tree (Timberlake).

Near *M. chrysomolybda* Meyr., but the palpi are wholly yellow, and the leaden coloration is not broken up into four distinct fasciae as in that species, and the latter does not have the white cilia of the forewings.



Mestolobes chrysomolbdoides.

Mestolobes quadrifasciata n. sp.

♂, ♀. Head brownish fuscous, a vertical white line extending forward from base of each antenna, a few white scales on outer side and behind insertion of antennae, collar white; antennae brownish fuscous spotted with white, in male thicker in diameter and finely and densely pubescent; palpi clothed with long loose scales, brownish fuscous, with a line of white scales continuing from the white collar, and some white scales nearer the apex. Thorax brownish fuscous, pronotum with posterior line of white scales, patagia bordered with white outwardly. Legs ochreous, tarsi fuscous, ringed with white. Abdomen ochreous to greyish fuscous, apical margins of segments paler. Forewings ochreous, with fuscous scales somewhat mixed and a tendency to border the four transverse white fascia representing the subbasal, first, median and second lines; subbasal line at one-fourth of costa, angled outwardly at middle; first line at one-third of costa, a little outwardly curved at middle, sometimes interrupted a little beyond middle; median line a little beyond middle of wing, hardly reaching dorsum; second line at three-fourths of costa, nearly evenly curved outwardly, reaches dorsum very close to tornus; a costal white dot just before apex; a terminal series of white dots among fuscous scales; cilia pale fuscous, dark fuscous at base. Hind-wings greyish fuscous, cilia the same, a little darker at base. Expanse of wings, 9-11 mm.

A small species, distinguished by the four nearly complete transverse white fasciae on the forewings.

Hab. Palolo, Mt. Olympus, Mt. Konahuanui, and Kaumuahona, Oahu, 1908-1914 (Swezey). A common species in the mountains near Honolulu.

Hyponomeutidae.

Semnoprepia pittospori n. sp.

♂ Head and thorax white, face and patagia fuscous; palpi with middle joint fuscous on outer side, terminal joint whitish; antennae dark fuscous; legs with femora pale ochreous, fore and middle tibiae and tarsi dark fuscous; hind tibiae pale ochreous, hind tarsi marked with fuscous. Abdomen very light fuscous, anal tufts pale ochreous. Forewings dark fuscous brown, with a whitish streak on dorsal margin; a short dark fuscous mark in the fold and just at the middle of the anterior edge of the dorsal whitish streak; apical cilia dark fuscous, cilia at tornus whitish, between this and apex spotted, fuscous alternating with whitish. Hindwings pale grey, cilia whitish. Expanse, 13 mm.

Described from 3 ♂ ♂ reared from dead *Pittosporum* wood, Kuliouou, Oahu, June 25, 1916 (Swezey).

Semnoprepia coprosmae n. sp.

♂, ♀. Head, thorax and palpi ochreous brown; antennae dark fuscous, basal fifth nearly black; legs with femora ochreous, fore and middle tibiae and tarsi dark fuscous, hind tibiae ochreous, hind tarsi marked with fuscous; abdomen ochreous. Forewings nearly uniformly ochreous brown; three conspicuous dark fuscous spots, one on middle of fold, one in the cell at middle of wing, one at end of cell; a series of small dark fuscous marginal spots extending around apex of wing; cilia ochreous. Hindwings pale grey without markings; cilia pale ochreous. Expanse, 18-23 mm.

Described from seven specimens (type ♂) reared from larvae feeding in live wood of *Coprosma longifolia* at Malamalama, a ridge on the windward slope of Mt. Konahuanui, Oahu, October 8, 1916 (Swezey).

The larvae of this genus are elongate and whitish and usually feed in dead wood; but the larvae of this species were found in the live wood and were quite abundant in the trees of the locality. The injury by them caused dead places in the tree trunks and branches, and a very rough, gnarlly appearance where the growing of the tree had partially overgrown the injuries. Pieces of branches containing larvae were brought in, and the moths issued November 20 to December 14. A series of 18 *Sclerodermus semnoprepiae* Bridwell also issued from this material, and cutting up some of the wood, it was

demonstrated that this parasite had bred on the larvae of *Semnoprepiae*. It was found to be a new species and described later by Mr. J. C. Bridwell.

Plutellidae.

Plutella capparidis n. sp.

♂, ♀. Head, thorax and abdomen dirty white. Antennae dirty white, with dark fuscous spots on apical half. Palpi brownish fuscous on outer side. Patagia brownish fuscous. Forewings brownish fuscous, with a wide dorsal streak of creamy white, having an oblique extension from near the tornus to the costa a little before apex, this streak irregularly sinuate on the anterior edge, the anterior edge nearly white and the brownish fuscous area of the wing has black scales on the edge bordering this streak, there are also a few scattered black scales on the dorsal margin; a narrow creamy white spot in basal third of costa, a larger some-

Plutella capparidis.

what triangular patch at middle of costa, each of these having black scales in the edge of the surrounding brownish fuscous area and the larger spot has a small spot of black scales on costa; cilia light fuscous mixed with paler scales, and a black line at the base. Hindwings and cilia very light fuscous. Anterior and middle legs dark fuscous, tibiae and tarsi with white rings; posterior legs dirty white, tarsi fuscous marked. Expanse of wings, 8-8.5 mm.

A very distinct species from *P. maculipennis* and *P. albovenosa*, the other species known to occur here. Described from 20 specimens reared from larvae found by Mr. J. C. Bridwell feeding on the leaves of *Capparis sandwichiana*.

Hab. Ewa Coral Plain, Oahu, June 8, 1919 (Bridwell).

The light green larvae feed mostly on the surface of the leaves, eating one epidermis and the parenchyma and leaving the other epidermis, which shows as dead spots in the leaves.

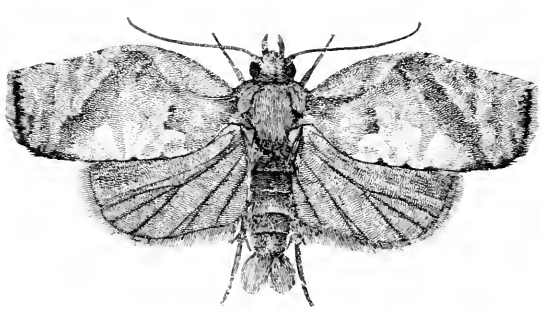
Occasionally the larvae have a tendency to mine within the leaf. Usually they are exposed, but sometimes covered by a slight web. The cocoon is made on the surface of the leaf. It is not so distinctly of an open network structure as is usual with *Plutella*, tho there is a tendency for it to be of fine network with a thin outer covering. It is denser than usual for *Plutella*, but thin enough so that the pupa can be made out inside.

The lot of larvae brought in by Mr. Bridwell, from which the 20 moths were reared, proved to be very highly parasitized by *Chelonus blackburni*. Thirty-three of this parasite issued from the lot, making a parasitism of 62%.

Tortricidae.

Capua reynoldsiana n. sp.

♂, ♀. Head, thorax, legs, palpi and antennae cinereous, the antennae somewhat fuscous ringed; abdomen pale ochreous, anal tufts concolorous. Forewings cinereous with numerous scattered spots of dark fuscous scales, the three largest spots in a line beginning with one on costa near base and extending obliquely backwards, about a dozen of the spots are on the costa; cilia cinereous. Hindwings cinereous with a slight ochreous tinge; cilia cinereous. Expanse, 15-20 mm.



Capua reynoldsiana

Described from a series of 29 specimens reared from larvae and pupae found on leaves of *Reynoldsia sandwicensis;* 7 of them from Niu, Oahu, Feb. 10, 1918; 11 from Wailupe, Oahu, April 21, 1918; 11 from Kunia, Oahu, November 20, 1918 (Swezey).

The caterpillar is green and spins together leaves to feed between. It pupates in spun-together leaves. The pupa is brown, 7-10 mm. long, with the usual two dorsal transverse rows of minute spines or serrations on the abdominal segments.

From the lot of caterpillars and pupae collected at Wailupe, the following parasites issued: 1 *Echthromorpha fuscator*, 1 *Pimpla hawaiiensis*, 1 *Cremastus hymeniae*, 3 *Chalcis obscurata*, and 1 *Chalcis obscurata* was dissected from a cocoon of *Cremastus hymeniae*.

Capua tetraplasandra n. sp.

♂. Head and thorax orange brown; antennae light fuscous, orange brown at base; palpi orange brown outwardly, whitish on inner side; legs ochreous, the anterior pair pale brown below; abdomen grey ochreous, the anal tufts yellowish. Forewings orange brown with numerous spots of metallic-tipped scales having a bluish tinge in certain angles, these spots arranged in transverse rows; a broad oblique darker brown band extends from outer end of costal fold to tornus, a faint indication of a similar band extending from outer end of costal fold to anal angle, in both bands some groups of black scales; the somewhat triangular area between these bands suffused dorsally with lemon yellow, and with three black spots on hind margin; terminal cilia ochreous with a basal black band, tornal cilia entirely black. Hindwings light fuscous, the costal portion pale; cilia pale, fuscous at base. Under side of wings with numerous fuscous bars. One specimen has the ground color of the forewings paler, and more black scales in the oblique darker bands, also a sprinkling of fuscous scales in apical third. Expanse, 16-17 mm.

Described from two males reared from larvae in fruits of *Tetraplasandra;* the type from Kaumahona, Oahu, November 17, 1918; the other specimen from Wailupe, Oahu, April 21, 1918 (Swezey).

Tineidae.

Gracilaria neraudicola n. sp.

♂, ♀. Head creamy white; antennae brownish, basal segment pale; palpi whitish, median joint fuscous at apex, terminal joint with fuscous band at middle and at apex. Thorax brownish fuscous, pale in middle

and posteriorly; legs ochreous, anterior and middle tibiae and tarsi and posterior tarsi fuscous marked. Forewings brownish fuscous, with three dorsal outwardly-oblique white streaks widened at base and margined with a few black scales, somewhat curved apically, the third one nearly connected with a white slender outwardly-oblique black-margined line at three-fourths of costa, beyond this white line three or four white costal spots; a round black spot at apex with a few pale bluish scales, a few pale bluish scales between this spot and the third dorsal white streak, sometimes this area ochreous; apical and terminal cilia brownish, paler near base and black at extreme base, tornal cilia very pale brown. Hindwings and cilia pale brown. Abdomen pale brownish. Expanse of wings, 7.5-8 mm.

Resembles *epibathra* Walsm. and *hibiscella* Sw., but a smaller species, the ground color of forewings darker, and slight differences in apical markings. Described from 6 specimens reared from mines in leaves of *Neraudia melastomaefolia*.

Hab. Two specimens Punahou, Oahu, June 11, 1916, and 4 specimens Waiahole, Oahu, August 13, 1916 (Swezey). A series of five specimens reared from leaves of *Pipturus albidus* at Pahoa, Puna, Hawaii, September 20, 1918 (Swezey) seems to be the same species. *Neraudia* and *Pipturus* are near related trees, and it is not unlikely that the same species might attack both plants, tho of three species of *Philodoria* mining *Pipturus* leaves, not one of them has yet been found mining *Neraudia* leaves.

Miscellaneous Notes on Hymenoptera, 2nd Paper, With Descriptions of New Species.

BY JOHN COLBURN BRIDWELL.

25. Bathymetis sp., a Cryptine Parasite of Siphona stimulans and Other Dung Fly Larvae.

Among the parasites of dung flies secured by Mr. A. Koebele in Germany and Switzerland in his search for parasites of the hornfly and sent to Honolulu for liberation, was a species of *Bathymetis* which the literature at hand does not permit us to identify. Specimens in the collection of the

Hawaiian Sugar Planters' Association show that it was bred from material sent in 1908, 1909, and 1911.

Mr. Swezey (Planters' Record 2:360-366, 1910) records breeding it from some lots of material received October 15, 1909. Some parasites had already emerged and died, twelve were still living and twenty more emerged during the following week and a new generation was secured, and by November, eight adults of a new generation were secured from dipterous puparia in cow dung, the parasite ovipositing in the puparia. Subsequent sendings received from Oct. 28 to Jan. 7, 1910, produced about 475 parasites and from these and the parasites secured by breeding, colonies of 20 females and 20 males were liberated in Manoa Valley (Nov. 1909); 21 females and 39 males in Nuuanu Valley (Nov. 1909); 26 females and 34 males at Waialae Dairy; 26 females and 34 males (Nov. 1909) and about 12 females and 30 males (May, 1910) also on Oahu, the exact locality not designated and on Maui, at the Grove Ranch, 11 females and 17 males (Jan. 1910); and a colony of 16 females and 34 males were sent to the Parker Ranch on Hawaii for liberation (Dec. 1909). Mr. Swezey also records (*Op. Cit.* 7:258, 1912) receiving a shipment from Switzerland on Nov. 29, 1911, from which 14 females and 30 males emerged during the next two months of which some were liberated.

He found that with the advent of the winter season with its slight reduction of temperature most of the parasites went into a hibernating condition on reaching full larval growth, some keeping dormant in this way from December until May.

It is interesting to note that there is a single male of this species in the collection referred to, bred out January 4, 1912, from a puparium brought down from Manoa Valley by Mr. Muir. I cannot find that the species has been seen since. It does not seem that the species could in any case prove very important in the control of the horntly, since it attacks the puparium and this in the horn fly is tightly enclosed in the hardened dung so that the parasite would have

great difficulty in penetrating to it, its ovipositor being too short to penetrate to any great distance. It is also not in any way a special enemy of the hornfly but apparently attacks any muscoid puparia it encounters.

26. Aspilota konae Ashmead.

This species has been taken in recent years on Oahu only in the mountains; on Mt. Kaala, in Wailupe, Palolo, Waimano and Opaeula valleys by Swezey, and from Mt. Kaala, Palolo and Kuliouou by Timberlake.

In January or February, 1914, the tree shells of the genus *Achatinella* were found down on the paths along the Castle trail in large numbers and from them were bred the Sarcophagid *Dyscritomyia* sp. From one of the puparia of this fly 5 or 6 Alysiids were bred. In the press of other work at the time this material was probably all lost, but I am inclined to believe that it was this species which emerged. In any case it has so far always been taken in the regions where these flies are found. It would not be surprising if it should prove to be an endemic species.

The variation in the number of antennal joints in the species is most remarkable. I have seen females with 26 joints and others with but 18 while the type was described as having 28 joints.

27. Table of Some Species of Hawaiian Braconidae.

With the exception of one or two species, the Braconidae found in the Hawaiian Islands are immigrant forms brought in by the ordinary operations of commerce or, in some instances, purposely introduced in the effort to control obnoxious insects. In all about forty species are now known to be established and it is desirable for the use of local workers to have the species tabulated. The writer has recently tabulated* the species falling into the sub-family long known as the Braconinae but which through the vicissitudes of type

*Proc. Haw. Ent. Soc., IV, No. 1, p. 113, 1919.

fixation have required a new group name. For this group Gahan has proposed the name Vipiinae**. This name apparently cannot stand. In the first place the genitive of *Vipio* is *Vipionis*, and the subfamily name based on it is correctly Vipioninae which the writer used in the place referred to. But the name of the genus which is the type of the subfamily is now *Microbracon* and the subfamily should then be called the Microbraconinae.

The Braconidae tabulated here have been placed in various subfamilies but to the writer they seem to belong together. However, in default of opportunity for thorough consideration of the matter he does not wish to give them at present any common designation.

They have the following characters in common: the head is completely margined behind and there is a sinus between the clypeus and the mandibles. In all but the wingless endemic *Ecphylopsis nigra* Ashmead the parapsidal furrows are strongly impressed, there are two closed cubital cells in the front wing and in the hind wing there are two cross veins extending backward from the mediellan vein, a nervellus near the middle of the mediellan cell and a postnervellus interstitial with the basellus. All the species so far as their habits are known are parasites of beetle larvae and all of these but *Heterospilus prosopidis*, the *Bruchus* parasite, attack wood-boring beetles. The habits of the endemic *Ecphylopsis* are unknown.

TABLE OF SPECIES.

1. Wingless, a very small mountain species. 1. *Ecphylopsis nigra.*
   Winged species ---------- 2.

2. Abdomen petiolate or subpetiolate, the first tergite much longer than broad and its sides parallel---------- 3
   Abdomen not petiolate, first tergite with the sides converging in front, its posterior margin but little if at all shorter than a side ---------- 4

**Proc. U. S. Nat. Mus., 53:106, 1917.

3. Abdomen distinctly petiolate, the first tergite subcylindrical, hind femora simple, not toothed----------2. *Spathius perdebilis* Perkins
Abdomen with the first tergite flattened, but little narrower than the third, hind femora incrassate and toothed beneath.
3. *Euscelinus peregrinus* Perkins

4. First tergite about one and one half times as broad as long, abdomen oval, hind wings of male with pseudostigma.
4. *Heterospilus prosopidis* Viereck
First tergite not broader than long, abdomen more elongate, hind wings without a pseudostigma---------- 5

5. Subdiscoidal nervure continuing in the same line with the discoidal, abdomen with transverse row of crenulate sulci on tergites 3-5----------5. *Hormiopterus vagrans* n. sp.
Subdiscoidal nervure arising from the interbrachial nervure, abdomen without transverse row of crenulate sulci except on tergite three ---------- 6

6. Female and male pale testaceous, thorax and abdomen often much infuscate but the parapsidal furrows always pale, third tergite without a crenulate furrow.
6. *Ischiogonus palliatus* (Blackburn)
Female with the head pale, thorax and abdomen black, male pale testaceous, third tergite with a crenulate furrow.
7. *Ischiogonus pallidiceps* Perkins

28. A New Immigrant Hormiopterus.

Hormiopterus vagrans n. sp.

Female: Head brownish-yellow, eyes black, mandibles and antennae infuscate toward apex; thorax and abdomen dull reddish brown, propodeum and first tergite black, the other tergites more or less dark on the disk; legs pale testaceous, the tarsi a little infuscate at apex; ovipositor sheaths black apically, paler at base; wings subhyaline, iridescent, the nervures blackish, paler apically, stigma and costa except at apex pale testaceous.

Antennae about 35-jointed, about as long as the entire body, all the joints longer than broad, first flagellar joint a little longer than the second; face thinly hirsute, finely granular, with shallow indefinite punctures; eyes rounded, exceedingly slightly emarginate opposite the antennae, malar space broad; genae a little broader below; ocelli in a very small triangle, separated from each other by but little more than the diameter of one, much nearer to each other than to the eye margin; front, vertex, and occiput minutely tessellate; occiput and vertex with the hairs directed forward.

Mesonotum roughly tessellate or granular, hirsute, the parapsidal furrows converging behind and meeting at about two-thirds of the distance to the scutellum and continued to it in a broad shallow rugulose

furrow with three longitudinal carinae; sides of pronotum rugulose with a longitudinal carina near the middle reaching to the front and hind margins; mesopleura and mesosternum margined in front, a deep smooth furrow on either side separating the sternum from the pleura, the vertical furrow broad and rugose, mesopleura tessellate granulate above, smooth below and shining as is the sternum, middle line of mesosternum crenulate; prescutellar sulcus not deeply impressed, divided by about five raised longitudinal lines; propodeum with two well defined lateral areas touching in front and each bounded by a raised consute line, the rugose petiolar area therefore narrowed.

Abdomen slightly longer than head and thorax combined, widest across the fourth segment, the ovipositor about two-thirds as long; pedicel about as long as its apical width and longitudinally, coarsely rugoso-striate; second tergite short, transverse and closely fused with the third, its apical margin broadly raised and polished its broad margin more narrowly raised and smooth, between is a transverse row of longitudinal sulci and coarse striae; third and fourth tergites each with a transverse row of crenulate sulci at the basal margin, the striae separating the sulci radiating obliquely outward especially towards the sides of the disk and gradually becoming obliterated before reaching the apical margin, which is smooth, the striae sometimes branching or more often with secondary finer striae in the interstices but these generally do not reach quite to the basal margin; fifth tergite similar to the preceding two but the striae are wholly longitudinal and parallel; second to fifth tergites moreover become rugoso-striate on the vertical sides and slightly more finely sculptured here than on the disk; sixth tergite minutely tessellate at base and finely, transversely lineolate at apex; last two tergites mostly concealed beneath the sixth and apparently wholly smooth.

Length, 3.6; wing, 2.8; ovipositor, 1.1 mm.

Male: Similar to the female, but the abdomen is much slenderer, the second tergite no shorter than the following segments; each of the first five tergites, including the pedicel, with coarse striae reaching nearly to the apex of the segments, the interstices rugose with fine cross lines; antennae with about 27 to 29 joints.

Length, 2.6; wing, 2.3 mm.

Described from 16 females, 11 males reared from larvae of *Neoclytarlus euphorbiae* from Ewa Coral Plain, Oahu, June, 1919 (Bridwell), and 12 females, 4 males collected in Honolulu, on Mt. Tantalus, and in Palolo, Nuu, Waihupe, Kuliouou and Waianae Valleys, Oahu (Giffard, Swezey and Timberlake), the earliest specimen having been taken in Nuu, Feb. 1, 1914 (Swezey).

Type and allotype in the collection of the Hawaiian En-

tomological Society. Paratypes in the collection of the Hawaiian Sugar Planters' Association, and in the collections of Mr. Timberlake and the author.

29. Oviposition of Ischiogonus palliatus (Blackburn).

A lot of three females and males were bred from a larva of *Plagithmysus pulverulentus* under the bark of *Acacia koa* from Oahu brought in by Mr. Swezey. These emerged about June 15, and were fed and seen to mate and were placed with a branch of *Euphorbia* containing larvae of *Neoclytarlus* and on July 7 four males and three females had emerged. These were placed with material containing larvae of *Neoclytarlus*. A female was seen ovipositing July 8, the oviposition being similar to that of *Heterospilus prosopidis*, the ovipositor being grasped by the apical two-thirds of the sheaths, the bases of the sheaths and ovipositor being widely separated. The sheaths are strongly bent and served to brace the ovipositor while in operation. The oviposition was nearly complete when noticed and no details further were observed.

This species has been recorded by Dr. Perkins as attacking the Plagithmysine beetles in the native forests. My observations show that these attacks are responsible for a very heavy mortality among them, particularly in the case of species attacking thin-barked trees.

30. Myrmosula Bradley.

Myrmosa parvula Fox and *M. rufiventris* Blake were originally included. The former may be considered the type. Probably the group is better considered as generic.

Myrmosula rufiventris (Blake).

This species has apparently been represented in collections by the unique type in the collection of the American Entomological Society from Nevada.

It is represented in the author's collection by a single

male collected at Corvallis, Oregon, June 30, probably 1907 or 8 (J. C. Bridwell).

This has since remained in my collection unidentified, the peculiar structure of the mandibles having been undescribed. The mandibles are rather elongate and slender and bidentate at apex, the lower tooth being much longer than the upper. When the mandibles are closed, doubtless the huge median tooth is concealed. This is sub-triangular, a little recurved, acute at apex, and a little longer than its distance from the upper (or inner) apical tooth.

In *Myrmosa unicolor* the mandible is tridentate at the apex and the inner broad triangular tooth is much nearer the apex of the mandible.

31. Odynerus pseudochromus Perkins.

Occasionally this species has the angles of the propodeum reddish and a large round spot on either side of the second tergite.

The male varies also with clypeus with an encircling yellow margin as well as the red spots on the second tergite. Either of these variations may exist independent of the other.

Pseudochromus may be distinguished from *leiodemas* by the smooth lateral area on the dorsal face of the propodeum. This species employs the pupal chambers of Anobiid beetles from which the beetles have emerged as well as the pith cavities of the twigs. In either case the cavity containing the cells is closed by a mud plug at the entrance some distance away from the last cell. Two or three cells fill the Anobiid pupal chamber while I have seen nests of a dozen cells in pith cavities.

32. Two New Nearctic Species of Hypomiscophus Cockerell from the Pacific Coast.

Hypomiscophus Cockerell and *Miscophinus* Ashmead are synonymous and were published upon the same day. Prof.

Cockerell has apparently shown that his genus was published a few hours earlier and his name is accordingly used here.

Hypomiscophus aenescens n. sp.

Male: Length 4.25 mm.; wing 3 mm.

Black; face, front, and vertex, and thorax with dull bronzy reflections; mandibles rufopiceous apically, flavotestaceous basally as is the anterior margin of the clypeus; legs with the incisures and the hind tarsi obscurely testaceous; wings subhyaline, iridescent, apically infuscated; the nervures brownish except costa which is blackish. Face to front, occiput, and margins of tergites with conspicuous appressed pubescence appearing silvery in certain lights, elsewhere there generally lies conspicuous fine appressed pubescence. Clypeus with the middle lobe truncate apically, convex on the disk, not carinate; front with a feeble impressed line reaching two-thirds the distance from the antennal sockets to the anterior ocelli. Eyes convergent above; ocelli in an acute triangle, anterior ocellus larger, posterior ocelli a little nearer the eye-margin than to each other.

Pronotum about as long as the mesoscutum, its sculpture microscopically wrinkled longitudinally in front, transversely behind; the mesonotal sculpture is granulo-punctate; mesopleura similar; scutellum and metanotum similar; propodeum finely transversely striolate, the median longitudinal raised line distinct; sides of propodeum longitudinally striolate; the posterior face with a triangular fovea above, on either side of which are three or four strong short parallel transverse ridges.

Abdomen with the tergites tessellate; apices of sternites 2-6 with a few erect spines.

Hind and middle tibiae with a few black spinules; nervulus inserted nearly its length before the basal nervure.

Described from a single male with the antennae missing taken at Pamelia Lake on Mt. Jefferson, Oregon, July 16, 1917 (Bridwell). Type in author's collection.

Evidently related to *nigrescens* Rohwer, but the propodeum appears from the description to be much more strongly striolate in *aenescens* as well as the head and thorax being bronzy in *aenescens* and black in *nigrescens*.

Hypomiscophus timberlakei n. sp.

Female: Length 6.75 mm.; wing, 4 mm.

Black; scape piceous apically; tegulae black, piceous apically; mandibles obscurely flavotestaceous, rufopiceous at apex; abdomen ferruginous apically and the basal segment more blackish; tarsi dull reddish;

wings hyaline iridescent, infuscate apically; venation brownish. Face and occiput and apices of tergites with some appressed silvery pubescence, with some less conspicuous fine similar short hairs elsewhere generally.

Anterior margin of middle lobe feebly rounded out, impressed in the middle and slightly emarginate, the disk convex; front with a short, faintly impressed median line nearly midway between the antennal sockets and the anterior ocellus. Eyes rather strongly convergent above, ocelli in an acute triangle, the hind ocelli distinctly nearer the eye margin than to each other and nearer each other than to the occipital margin, three times the width of an ocellus in front of the summit of the eyes.

Front, vertex, pronotum, mesonotum, mesopleura, scutellum and metanotum appearing finely granular under a hand lens, really very closely minutely punctulate, propodeum very finely transversely obliquely striolate, the longitudinal raised line obscure, placed in a shallow groove, the sides obliquely longitudinally striolate, the posterior face with a triangular fovea above, with short transverse ridges on either side similar to those in *acutescens* but more numerous; abdomen tessellate.

Anterior tibiae with a comb composed of a few elongate setae; posterior and middle tibiae with a few spines. Sternites 2-5 with a few erect black setae on the margins.

Nervulus interstitial with the basal nervure. First joint of flagellum a little longer than second.

Described from two females collected at Idylwild, Mt. San Jacinto, California, July, 1912, the type collected by P. H. Timberlake for whom the species is named, and the other by the writer.

Type in the author's collection.

Two other species are described as having the abdomen more or less ferruginous. *H. arenarum* Cockerell is a smaller species (3 mm.), the tibiae are red and the longitudinal raised line of the propodeum is distinct. *H. texanus* (Ashmead) has the legs entirely red, the petiole of the 2nd cubital cell is described as only a third as long as the side of the cell while in *timberlakei* it is more than half as long. *Texanus* is a smaller species (3 mm.) and the propodeal raised longitudinal line is distinct, the collar is said to be brownish ferruginous and the two or three apical segments are said to be dark. These differences may be inconstant, since in the two individuals of

timberlakei before me, one has the apical segment black and the other is dark only at the apex.

33. A New Niteline Genus from South Africa.

Mutillonitela new genus.

Head transverse, oblong, the eyes elongate, convergent above occupying the entire side of the head from the vertex to the base of the mandible. Mandibles edentate, strongly notched before the middle. Clypeus transverse, broadly expanded in front, entire along the whole margin, with about six strong flattened blunt parallel spines beneath the margin in the middle. Antennae inserted just above the clypeus, the sockets in a line with the anterior margin of the eyes, scape stout and excavated at apex. Ocelli in an obtuse triangle, the hind ocelli in front of the summit of the eyes. A deep fovea between the ocelli and eye margin, wings somewhat abbreviated with completely closed costal, median, submedian, one cubital, one discoidal, and brachial cell. Radial cell very short, variably open at apex or closed, barely extending beyond the apex of the short first cubital cell, nervulus inserted before the basal, nervellus far before the margin of the radiellus.

Hind and middle tibiae spinose, the anterior tibiae of female with a well developed tarsal comb.

Abdomen of female without a defined pygidial area.

Head and thorax clothed with two kinds of pubescence, peculiar erect setae and the ordinary fine pubescence. Wings strongly pubescent, subhyaline to beyond the venation then strongly infuscate.

Related to *Saliostethus* and *Miscophoides* of Brauns but differs by the venation.

Type: *Mutillonitela mimica* Bridwell.

Mutillonitela mimica n. sp

Female: Length 5 mm.; wing 3 mm. more or less.

Black; legs, venter of abdomen and apical tergite dull ferruginous, the abdominal color darker; posterior margin of scutellum, mentanotum and outer half of wing base whitish; anterior calcar pale; middle (1) and hind (2) calcaria black; mandibles yellowish ferruginous at base, piceous apically; antennae brownish; venation of wing yellowish.

Face, front, vertex, pronotum and mesonotum with stout erect yellowish setae, mingled on the head and thorax above with finer silvery pile; coarse silvery hairs on mesopleura, propodeum, epipleura of tergite one, sternite two on the sides and margins of tergites and sternites.

Head, pronotum, mesonotum, scutellum, mesopleura and metanotum opaque and granular.

Collar about twice as broad as long, rounded down to the declivity; propodeum without a well defined basal area, the superior face with a

feeble longitudinal raised line in a shallow ill defined furrow, surface coarsely tessellate, with feeble radiating striolae basally and transverse ones apically, sides of propodeum obliquely striolate, posterior face narrow, with a shallow furrow and impressed line above, transversely strongly striolate throughout; middle and hind tibiae with stout white spines on the outer face as long as the width of the tibiae; front tarsi grooved beneath, the comb strongly developed; hind and middle tarsi strongly spinose.

Abdomen with the tergites not contracted at the sutures, very finely strongly punctate, the punctures separated by about two or three times their diameter.

Described from two females collected at the Mowbray Golf Links, Rappenberg, near Capetown, Feb., 1915 (Bridwell). Type in the South African Museum, paratype in the author's collection.

Mutillonitela lounsburyi n. sp.

Female: Similar to *mimica*. Length 5 mm.; wing 3 mm.

Clypeus pale, ferruginous, legs brownish piceous; scutellum and metanotum black; tergites 1-3 rufescent; apical two-thirds of tergite 6 whitish yellow; sternites 2-6 dark; pubescence of head much feebler and sparser; the setae reduced to pointed hairs.

Pronotum longer, punctate, the surface between more transversely rugulose; mesonotum similar; scutellum with the punctures very distinct, well separated; mesopleura shining, the punctures irregularly disposed; propodeum similar to that of *mimica* but the surface more rugose; sides of propodeum shining with strong, well separated punctures, the posterior face like that of *mimica*.

Abdomen shorter, more compact, first tergite broader, the punctures larger, stronger, and more separated.

Described from one female collected in the same locality as *mimica* Feb.-April, 1915 (Bridwell).

Type in the author's collection.

Both species were taken running along the bare sand and resemble closely the small *Mutillidae* which are found there, until disturbed when they escape by flying. I am disposed to consider this a real case of mimicry. A Nyssonid not yet studied was found under the same circumstances and even more closely resembling the *Mutillidae*.

Named in compliment to C. P. Lounsbury, the head of

the entomological service of South Africa, who extended me many courtesies during my stay in South Africa.

34. A New Silaon from the Hawaiian Islands with Descriptions of two others from California.

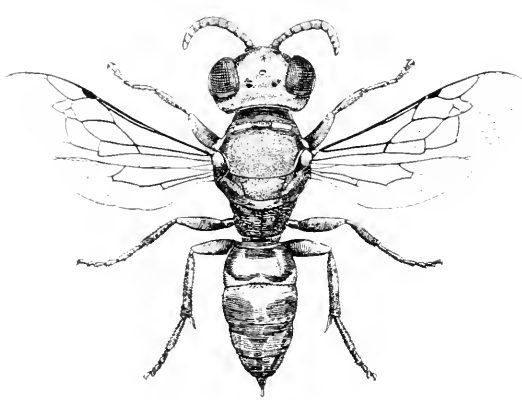
Silaon rohweri n. sp.

Female: Length 4.5 mm.; wing 3.5 mm.

Black; mandibles piceous at apex; transverse spots on either side of collar, apex of tubercles, small spots on tegulae, small spot on either side of metanotum, oval spot posteriorly at apex of front and middle tibiae, interrupted stripe on dorsal surface of hind tibiae not attaining base or apex, and calcaria yellowish-white; wings dusky subhyaline, strongly iridescent, venation dark brown.

Body with fine silvery pile covering the surface on the sides of the clypeus and sides of face.

Mandibles simple, clypeus produced in the middle and rounded with a rounded median longitudinal ridge continued as a fine carina to about the middle of the eyes, disappearing at the protuberance of the front; front vaguely and indefinitely impressed longitudinally in front of the anterior ocellus; eyes somewhat convergent above; ocelli in an obtuse triangle, the posterior ones in front of a line connecting the summit of the eyes, nearer to the eye margin than to each other; process and median ridge of clypeus smooth and shining, a few coarse punctures



Silaon rohweri.

on the edge of the pubescence which conceals the sides; front and vertex strongly confluently punctured, the genae and occiput more finely so.

Collar not margined or carinate anteriorly; mesonotum, scutellum, and mesopleura closely and subconfluently punctate; basal margin of

propodeum consute; superior face with irregular transverse well separated fine rugae; the surface between tessellate; with an imperfectly defined triangular basal area extending over on the declivity; posterior face transversely rugose or striate divided by the longitudinal sulcus; sides of propodeum finely longitudinally striate.

Tergites very finely but strongly punctate the interspaces, two or three times as wide as a puncture; first, second, and third tergites with margins depressed, more narrowly laterally; the depression of second and third is not quite one-third the length of the tergite. Sternite shining, more coarsely punctured, the margins testaceous.

Nervulus nearly interstitial, first recurrent received by the first cubital cell.

Male: Similar to female but the hind tarsi with the first and second joints pale.

The clypeus produced into a narrowly rounded tooth. The last joint of antennae longer than broad about as long as the three preceding joints. Next to last and preceding joint shorter above than below. Basal area of propodeum more definitely finely rugostriate, the striae radiating from the central furrow. Seventh sternite entirely concealed, eighth produced in the middle into a broad, flat truncate process a little longer than broad and about 1-3 the width of the sclerite.

Described from a single female specimen secured by sweeping at Waianae village, Oahu, at sea level, May 23, 1919 (Bridwell), and a male from Ewa Coral Plain bred from a cocoon in the borings of *Neoclytarlus euphorbiae*.

It is not absolutely certain that this is an immigrant species, since several endemic Hymenoptera occur in the locality where it was found. It is, however, probable that it is introduced through commerce, possibly from Central America or Mexico.

Named in honor of Mr. S. A. Rohwer, who has described a majority of the North American species.

Some dead *Euphorbia* wood containing the borings of *Neoclytarlus euphorbiae* Bridwell was taken at Sisal on the Ewa Coral Plain on August 31, 1919. The examination of two pieces of the main stem of a bush, probably from the same bush, revealed four cells constructed by this wasp. Each cell occupied the pupal chamber of the *Neoclytarlus* and the opening through which the adult beetle had emerged was plugged up with bits of coral, mud and vegetable debris, in one in-

stance some small dried leaves of the *Euphorbia* were used, in another the glumes of a grass. Apparently the mud is placed without much order within the chamber and there is no definite cell wall surrounding the prey and larva of the *Silaon*.

In two of the cells the larva had died and the dried up prey remained. This consisted of the nymphs of the Lygaeid bug, *Nysius*, belonging to an undetermined species. One contained 12 nymphs and a small dried up larva of the *Silaon*. But one of the nymphs had been fed upon. The other contained a larger dried up larva and four nymphs, two of which had been fed upon somewhat.

The other two cells contained a cocoon of the *Silaon*. These cocoons are nearly elliptical in outline with one end a little larger than the other. The cocoon is earthy, commingled with a little silk and sand grains. They are about 2 mm. thick by 5 mm. long.

The nesting place is similar to that described by Xambeau for *S. xambeani* André and the cocoon resembles that of that species. *S. compeditus* of Europe was found by Ferton burrowing in the ground and making a series of cells containing nymphs of Lygaeid, while Williams found *Silaon inerme* (Cresson) in Kansas storing Capsid (Mirid) nymphs in a hole in the ground apparently in a spider's burrow.

Since the description above was written Dr. F. X. Williams has taken additional material from the Ewa Coral Plain and observed the habits of the species in the field. I am greatly obliged to him for the opportunity to include this material in the type series: 6 females, 9 males taken at Sisal, March and April, 1920.

Type and allotype in the collection of the Hawaiian Entomological Society. Paratypes in the collection of the Hawaiian Sugar Planters' Association, and in the private collections of Dr. Williams and the author.

Through the kindness of Dr. Williams I am permitted to use the accompanying figure of the female which is his work.

Silaon blaisdelli n. sp.

Female: Length 3.5 mm.; wing 2.5 mm.

Nervulus interstitial with the basal nervure, first recurrent nervure received by the first cubital cell.

Black; mandibles more or less piceous at apex; interrupted line on collar, tubercles, spot on tubercles, tegulae, spot on apex of front and middle tibiae behind, stripe on tibiae outwardly, calcaria, and stripe on metanotum yellowish-white; margins of tergites and sternites pale testaceous. Body with appressed silvery pubescence, more conspicuous on sides of face, and on the margins of the tergites laterally. Clypeus shining not carinate, produced into a short rounded process in the middle, front below with a tectiform ridge; gibbosity of front not impressed; eyes but little divergent below; ocelli in an obtuse triangle; the posterior ocelli in front of the summit of the eyes, about one half as far from the eye margin as from each other.

Face, front, vertex, occiput, collar, mesoscutum, scutellum and metanotum finely, closely and distinctly punctate, the metanotum more finely so; mesopleura with the surface sculpture similar in general but somewhat concealed by the pubescence, above the impressed pit on the mesepimeron is an ill-defined, glabrous shining spot with the surface microscopically tessellate. Propodeum with the basal area well defined by a U-shaped raised line, basally are some weak radiating striae not one-fourth the length of the area, apically the rugosity of the surface is transverse; sides of propodeum finely longitudinally striolate; fovea of posterior face shallow, the parallel transverse ridges feeble but numerous and reaching well toward the sides.

Wings subhyaline, iridescent, the venation brownish. The petiole of the second cubital cell short, not more than a fourth the length of the sides of the cell, the cell triangular.

Abdomen shining, finely, discretely punctate.

Described from a single female collected at San Diego, California, March 29, 1891 (Dr. F. E. Blaisdell). Type in the author's collection.

Similar to *rohweri*. From *rohweri* it differs by the well-defined propodeal area and longer propodeum. The basal area is V-shaped in *rohweri*. *Parvus* (of which the female is undescribed) is described as having the radial cell not appendiculate while it is distinctly so in *blaisdelli*. The basal area of the propodeum of *parvus* is described as triangular while it is distinctly rounded behind in *blaisdelli*. Otherwise from the description the species are very near each other.

Silaon similis n. sp.

Length: 6.5 mm.; wing 4 mm.

Nervulus inserted distinctly beyond the basal (about the width of the vein), first cubital cell receiving both recurrents.

Black; transverse spot on either side of collar, tubercles, narrow apical line at apex of trochanters behind and spot on the middle of hind tibiae behind yellowish-white; calcaria whitish; mandibles piceous at apex; tegulae, tarsi, and margins of abdominal segments brownish; wings subhyaline, nervures yellowish except costa and stigma, blackish.

Appressed silvery pubescence very conspicuous on clypeus and face, less so on cheeks, collar, mesopleura, sides of propodeum and base and apex of tergites (interrupted medially), continued along the sides of the abdomen. Middle tibiae with a few whitish spinules, sternites 2-5 with the usual erect whitish setae on the margins.

Clypeus strongly carinate, the apical margin of the middle lobe thickened and shining, subtruncate, a little rounded out; eyes strongly convergent above; carina extending from the clypeus over the front, not strong, connecting a little above the antennal sockets with an impressed line which deepens into a shining fovea on the middle of the front and is continued faintly to the anterior ocellus. Front rather strongly, coarsely and closely punctured, becoming striate in the depression in front of the large front ocellus, vertex longitudinally striate between the ocelli, smooth and shining obliquely in front of the hind ocelli with a few fine punctures on the orbits there; the head behind the ocelli and the occiput transversely striatopunctate; ocelli in an equilateral triangle, the hind ocelli a little nearer the eye-margin than to each other and further than this from the occipital margin.

Pronotum very short, a little notched in the middle, abruptly declivous in a plane in front but not carinate. Mesonotum closely, coarsely subconfluently punctured, the parapsidal and median lines indicated but not impressed; mesopleura without an impressed pit, more discretely punctured on its disk; scutellum strongly discretely punctured more sparsely on the disk; metanotum very finely and closely punctured; propodeum with the basal area ill-defined, bare, opaque, with a few radiating wrinkles more distinct at base and an imperfect raised line, the general surface subreticulate, with smooth shallow punctures in the interspaces; the basolateral areas with the surface concealed by pubescence; sides of propodeum glabrous shining, obliquely striolate, posterior face transversely striate, the fovea rather shallow.

Abdomen shining, the first tergite strongly finely rather deeply punctate, the others more finely and less distinctly so; sternites similar.

Closely related to *S. plenoculoides* (Fox) but the middle tibiae have some spinules, and the details of the head and propodeal sculpture seem different. Rohwer describes the pro-

notum of *plenoculoides* as carinate, which certainly does not apply to the present species.

Described from a single female collected at Berkeley, California, May 12, 1912 (Bridwell). Type in author's collection.

Notes on the Bruchidae (Coleoptera) and their Parasites in the Hawaiian Islands, 3rd Paper.

BY JOHN COLBURN BRIDWELL.

Bruchus prosopis Leconte.

This species has been increasingly numerous and destructive in its attacks upon the seeds of *Prosopis juliflora*. This condition led to the problem being taken up by the Union Feed Co. of Honolulu, who made possible the continuance of investigation on the weevil injury to the algaroba beans. An economic report upon these injuries was submitted to Mr. F. W. Mefarlane, the president of this company, on December 24, 1919, and this is soon to be printed in a slightly altered form in the Hawaiian Sugar Planters' Record. On Feb. 1, 1920, these investigation were taken up by the Bureau of Entomology of the U. S. Department of Agriculture, and these notes are designed to bring up my records regarding the Bruchids to that date.

The attack by this species upon the young pods begins soon after they are set, when the seed is very small and the whole pod is only about one-eighth of an inch in thickness. The eggs are laid singly or in small masses of two or three, or perhaps more, cemented lightly to the pod.

The puncture made by the hatching larva results in a copious exudation of gum which is at first clear but later becomes brownish. This seals the entrance hole and often dislodges the egg mass so that the other larvae are unable to enter the pod.

The eggs of this species being usually laid at a time

when the pod is very young and in a formative condition, the larva on entering sets up a considerable disturbance in the developing tissue, some of it probably caused by the entrance of bacteria. If the eggs are laid on the edge where the young saclike developing seed is attached, this injury very frequently prevents further growth of the embryo seed, and thus a considerable loss of beans is caused in which the young larvae have not fed. The pod is also frequently deformed as the result of these attacks.

The young larva, instead of entering the developing seed at once, feeds for some time in the gummy or syrupy layer between the inner and outer fibrous layers of the pod. It is not until the young seed has reached practically its full dimensions and when its cotyledons are firm in texture that the larva enters at one edge and makes its way to near the center of the seed. Here it feeds rapidly and attains full growth and pupates after destroying the entire embryo before the pod has reached its full thickness and before the pulpy and syrupy layer has attained its full thickness.

The young pod is at this time about three-sixteenths of an inch or less in thickness, against the five-sixteenths of an inch attained at full maturity, and the pod is much easier of penetration by the ovipositor of the parasites than later when the fibrous layers have become hard and woody. It is at this time the attacks of *Heterospilus prosopidis* Viereck upon the *Bruchus* larvae usually take place.

The destruction of the very young beans and the eating of the green beans in a later stage of their development constitute the greater part of the injury done by this *Bruchus*.

The adult weevils can, as has been previously recorded, oviposit in crevices in the ripe pod, very often in the holes from which the weevils have emerged, and the larvae enter into the ripe seed and devour its contents. It seems probable that this reinfestation is likely to be more extensive when the pods are so damp as to give considerable fluidity to the syrupy contents of the pulp and to soften the seed coats.

While the observations have not been carried out to enable us to state with exactness the time required for the development of *Bruchus prosopis* in the green pods, the indications are that the period is about four to six weeks from oviposition to the emergence of the adult upon the pod. In any case the emergence from the pod takes place soon after the ripe pod falls to the ground or even before, some even while the pod is still green. In any case all the injury from the initial attack is completed by the beginning of storage while much of the emergence is completed soon after.

In contrast to this short period for development, the only record of timed breeding from ripe pods yet secured gives a period of 130 days for development during the cooler months of the year here.

Bruchus sallaei Sharp.

This species has now spread from the originally discovered center of infestation upon Punchbowl crater to both extremities of the island of Oahu at Kaena and Makapuu Points.

Observations previously made indicated that this species could breed at the expense of the seeds of *Prosopis juliflora*. In November, 1919, examination of weevils bred by Mr. Pemberton from pods of algaroba gathered at Waikiki showed that 23% belonged to this species and more recent breedings show that this species frequently outnumbers *B. prosopis* in the pods of *Prosopis*.

It is exceedingly curious that the eggs of this species now seem to be much more frequently laid in compact masses of 2-7, or more eggs, than previously observed. In 1918, only an indication of this was observed but now the prevailing method of oviposition upon the pods is in masses. The eggs laid upon the seeds of *Acacia farnesiana* within the pods seem to be always laid scattered. Ordinarily the eggs of this species are not laid upon the green pods of *Acacia farnesiana*, but Mr. Swezey has shown me a few laid upon green but

mostly well-grown pods. On the other hand the eggs seem to be laid upon the pods of *Prosopis* in all stages of growth from the newly set pods to those fully ripe. It does not show the aversion to laying its egg masses upon exposed surfaces which is so characteristic of *B. prosopis* when laying upon the ripe pods.

The eggs from this species when laid in masses are not readily distinguishable from those of *B. prosopis*, though the latter seem to be somewhat smaller and more slender.

There is every indication that in this species, which until last year was not known to attack the seeds of *Prosopis*, we have an enemy of first importance more adaptable and perhaps more serious than either of the other species attacking this crop in the Hawaiian Islands.

Bruchus limbatus (Horn).

In June, 1919, Mr. Swezey and Mr. Pemberton found at Waipio, Oahu, a seed of the monkey-pod *(Samanea saman)* bearing eggs of a Bruchid. After bringing this into the laboratory, four adults emerged from the seed. Examination of these led to their determination by the writer as *Bruchus limbatus* Horn, an inhabitant of the arid Southwest, Texas, Arizona, South California and Mexico.

Subsequently the species has been found rather generally distributed in Honolulu and as far along the Kamehameha highway as Castner. It has not yet been found upon the windward side of Oahu.

Besides *Samanea saman*, this species has been found here breeding naturally in the seeds of *Pithecolobium dulce* and *Albizzia lebbek*, while it has been bred experimentally from the seeds of *Acacia farnesiana* and from the pods of *Prosopis juliflora*. In the latter case the breeding was secured only after repeated experiment and then only a few adults emerged. It is interesting to note that most of the trees upon which it has been found breeding in the open here are natives of its home country, or at least of the American continent. They

are all plants of considerable importance in tropical agriculture and forestry.

It is uncertain how long the species has been established in the islands but certainly its general spread over this island has occurred since 1917, since the trees of *Pithecolobium* under which extensive collections of seeds were made at that time without finding this weevil, have the fallen seeds infested now.

Cushman has recorded this species (Jour. Econ. Ent. 4:498, 1911) as bred from an unknown leguminous chaparal at Brownsville, Texas, called "tenaza" by the Mexicans, and from *Siderocarpus flexicaulis*. Amundsen reported this species from an undetermined Mexican legume presumably growing at San Diego, California, called Guamuchile by the Mexicans. This plant, judging from his figure of the pod and seed, is *Pithecolobium unguiscatae* or some allied species.

On Dec. 26, 1919, this weevil was found at work on the fallen pods of *Samanea saman* on the government road not far from Pearl City. Eggs had been laid in great numbers on the under side of the old pods as they lay on the ground and many others on the seeds as they had been exposed by the weathering of the pods. Those eggs so concealed had been but little parasitized by *Uscana*, though a few parasitized eggs were seen.

Examination of the pods showed them to be in general without syrupy contents. They were also somewhat attacked by *Pyroderces rileyi*, and one or two other moths, by *Araeceras fasciculatus* and one of the species of *Carpophilus*.

A well-grown pod at maturity is about 6-8 inches long, not quite an inch wide and a half inch thick and contains 18-22 or more seeds, each in a separate chamber formed by the firm, rather woody layer of the pod, with layers of the two halves touching each other between the seeds. There is a cellular syrupy layer between the inner layer and the firm cuticle. Each edge of the pod is thickened and the pods do not dehisce. The seeds are $\frac{3}{8}$ in. (9 mm.) long, nearly

5 16 in. (7 mm.) wide and 9/32 (5.5 mm.) thick, shaped like a grain of corn as seen flat and thicker before the middle. There is no apparent albumen and the seed coat is thickest at the edge. The emergence holes of the weevils are therefore generally found along the edge of the seed.

From 69 seeds examined from a lot in which the weevils had been breeding for three generations 193 weevils had bred as follows:

From	13	seeds	containing	1	exit	hole	.....	13
"	20	"	"	2	"	holes	.....	40
"	20	"	"	3	"	"	.....	60
"	8	"	"	4	"	"	.....	32
"	3	"	"	5	"	"	.....	15
"	3	"	"	6	"	"	.....	18
"	1	"	"	7	"	"	.....	7

In the "Table of Hawaiian Bruchidae" (these Proceedings 3:466, 1918) this species would run to 8 and differs from *Bruchus prainianus* by the red markings of the elytra.

Caryoborus gonagra (Fabricius).

While the eggs of *Bruchus prosopis* are laid early enough in the development of the algaroba pods that the principal damage is completed before the crop is harvested, this species oviposits usually upon the ripe pods and the main feeding is done in stored beans.

Uscana Semifumipennis Laying in Eggs of Bruchus Sallaei.

On November 25, newly emerged *Bruchus sallaei* females were placed with a pod of *Acacia farnesiana* and left until about 10 a. m., November 27, when many eggs had been laid scattered on one surface. This pod was then placed in a test tube with newly emerged *Uscana* from eggs of *Caryoborus*. By 12 m. the females were seen ovipositing and mating was in progress.

From the effects of the parasitization all but one of the eggs were later found to be parasitized.

Later observations indicate that the attacks of this species are confined to the recently laid (unincubated) eggs of its hosts.

The parasitization records of this species now include *Bruchus prosopis* and *Bruchus limbatus*.

I have observed eggs of *Bruchus sallaei* and *Bruchus prosopis* concealed within pods parasitized by this species.

Descriptions of New Genera and Species of Hawaiian Encyrtidae (Hymenoptera), II.

BY P. H. TIMBERLAKE.

ECTROMATINI.

Anagyrus antoninae n. sp. Figs. 1, 2.

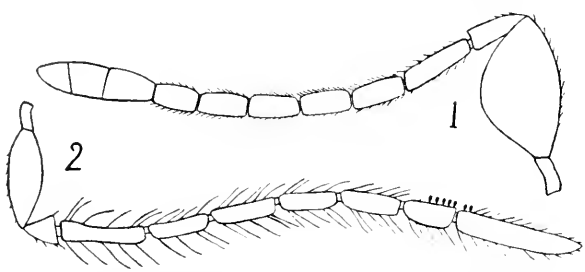
A rather slender species belonging in the subgenus *Epidinocarsis* Girault but differing in the opaquely alutaceous sculpture and abundant white pubescence of the mesonotum.

Female: Head thinly subhemispherical, a little broader than long, thickest just above the anterior corners of the eyes; as seen from the side the curvature somewhat more abrupt next to the mouth and more gradual towards the occipital margin; as seen from in front the cheeks converge slightly towards the rather wide mouth. Occiput moderately concave with the margin rather acute above; frontovertex about one fourth longer again than its width at the ocelli, noticeably but not greatly widening anteriorly; ocelli placed in a right-angled triangle, the posterior pair about twice their own diameter from the eye-margins and three times their diameter from the occipital margin; eyes rather broadly oval, more bluntly rounded at the anterior end, strongly convex and slightly protuberant, just touching the occipital margin posteriorly, the outer margins nearly straight; face very slightly inflexed at a point opposite the lower third of the eyes, the scrobes rather deep, slightly converging but not meeting above, the facial prominence between the antennae somewhat arched below and visible in side view of head, the oral margin prominently emarginate at the middle, with the sinus rounded; cheeks short or about equal to two-thirds of the

Proc. Haw. Entom. Soc., IV, No. 2, June, 1920.

eye width. Antennae inserted rather near together, close to the oral margin but nevertheless slightly more than half way to a line connecting the anterior corners of the eyes, the upper end of the sockets touching this line; scape very broadly expanded beneath and excluding the radicle over one half as wide as long; pedicel slender and elongate, about equal to the second funicle joint; flagellum slender, cylindrical, slightly thicker distad; first funicle joint about four times longer than thick, the following joints gradually shortening, the last two joints equal and about twice as long as thick; club after collapsing slightly wider than the funicle and nearly as long as the three preceding joints combined, rather acutely pointed at apex, its first joint longest, the middle one shortest.

Thorax moderately robust, rather wide and strongly depressed;



Figs. 1 and 2, *Anagyrus antoninae*, female and male antennae respectively.

pronotum strongly arcuate; mesoscutum nearly twice as wide as its median length, its posterior margin straight except for a rounded median projection which overlaps the inner ends of the axillae; scutellum large, somewhat longer than wide and rather acute at apex. Abdomen about a fourth longer than the head and thorax combined, very narrowly triangular as seen from above, strongly compressed with the dorsum deeply sunken in after death; ovipositor shortly protruded, its sheaths compressed, broader towards the base and tapering towards the apex.

Wings reaching slightly beyond apex of abdomen, rather narrow; marginal vein about thrice as long as thick, nearly equal to the stigmal, the latter straight, slightly enlarged at apex with a short stout spur, postmarginal vein short and spurlike; discal ciliation moderately dense, nearly uniform to the base of the wing, the speculum broad, extending obliquely a little more than half way across the disk from the stigmal vein and with a very small cut-off portion below widely separated from the main part.

Head rather smooth and somewhat shiny, with extremely minute granular reticulations, the frons with rather numerous minute pinpunctures; mesonotum opaquely alutaceous; metanotum, propodeum, pleura and abdomen somewhat shiny, the pleura being very finely and

delicately reticulate, the abdomen more distinctly reticulate with the lines on the first tergite arranged more or less concentrically, more distinctly so towards the middle of the segment, the middle tergites smooth and polished, the last tergite more coarsely reticulate with longitudinal lines and appearing somewhat rugulose.

Eyes with a very fine, sparse pile; cheeks, lower part of face, anterior orbits of eyes, and the frons with moderately abundant whitish pubescence; oral margin with a fringe of much longer white hairs; mesoscutum, axillae and scutellum with a moderately dense, appressed white pubescence of short flattened hairs, the scutellum with a pair of rather long, black bristles at apex and a pair of shorter bristles placed just in front of the apical pair and more towards the sides; metapleura, first tergite and sides of abdomen with a few scattered, very fine, whitish hairs.

Length: (1.00 to) 1.87; width of vertex: 0.210; width of mesoscutum: 0.52; length of fore-wing: 1.37; width of fore-wing: 0.523 mm.

Head black, the mandibles reddish brown; scape shining black with a broad, transparent white band just before the apex, base of pedicel black, the apical two-thirds white, funicle blackish gradually becoming paler distad so that more or less of the sixth and sometimes part of the fifth joint becomes yellowish white like the club. Mesonotum dull ochraceous orange (R.), the anterior margin of the scutum blackish, or more rarely and apparently only in small specimens the whole scutum except laterally and the central part of the scutellum may be suffused with black; posterior margin of the propleura, anterior part of the mesopleura and the mesosternum nearly concolorous with mesoscutum; rest of the propleura and pronotum black; most of the mesopleura, the metanotum, propodeum and abdomen blackish, the metapleura and sometimes the base of the venter brown; prepectal plates and tegulae whitish. Legs maize yellow (R.), the coxae more whitish, the tarsi deeper yellow with apex of the last joint blackish. Wings hyaline, the veins yellowish brown.

Male: Head much thinner fronto-occipitally than in the female, the curvature nearly uniform from oral to occipital margin, as seen from in front somewhat broader in proportion to the length, being widest above the middle of the eyes; the latter more protuberant and considerably smaller; frontovertex plainly wider than long, the ocelli in a slightly obtuse-angled triangle, the posterior pair about as far removed from either the eye or occipital margin as one half their distance apart; face and cheeks considerably longer than in the female, the scrobes in the form of rather short parallel furrows extending upward to the middle of the eyes and separated by the facial prominence, which is not arched and smaller than in the female so that it is hardly visible in side view of head. Antennae inserted close together just below the line connecting the lower corners of the eyes and far removed from the oral margin; scape somewhat shorter than in the female, compressed but much less expanded beneath, being narrowly oval or about one

third as wide as long excluding the radicle; pedicel short or hardly longer than its apical thickness; flagellum slender, cylindrical, clothed with long hairs more or less distinctly verticillate, each funicle joint angularly incised at apex; first funicle joint about five times as long as thick, the following joints gradually shortening, the sixth being somewhat more than one half as long as the first; first joint with five whorls of hairs, the following joints with three whorls, the hairs on the under surface excepting on most of the first joint one half shorter and semi-decumbent; club long, slender, very pointed at apex, as long as the last two funicle joints and one-half of the fourth joint, provided with about seven whorls of hairs which become gradually shorter and more crowded towards the apex; under side of the sixth funicle joint with a row of five to seven short, erect, clavate hairs, the base of club with two more in alignment.

Thorax as in the female; abdomen much smaller, or about four-fifths as long as the thorax, being ovate, depressed, broadest just beyond the cordate base and truncate at apex. Wings somewhat shorter and proportionately much wider than in the female, the disk much less densely ciliated; the speculum broad, extending from the stigmal vein obliquely towards the opposite margin, briefly interrupted below the middle, the cut-off portion being large and distinct; marginal vein much shorter or about equal to one-half the stigmal, the postmarginal better developed or as long as the marginal.

Face, mesoscutum and axillae very minutely reticulate and moderately shiny, the frontovertex more opaque and microscopically, transversely lineolate with a few scattered minute punctures; scutellum granular reticulate and opaque but becoming smooth and shining on the lateral and posterior margins, pleura and abdomen a little more shiny and more coarsely reticulate than the mesoscutum, the lines on the first tergite concentrically arranged as in the female. Pubescence about as abundant as in the female but much less conspicuous, being whitish only on the face and cheeks and less distinctly whitish on the sides of the mesoscutum, the hairs on the mesonotum being longer and not flattened; eyes more densely pubescent.

Length: (0.61 to) 1.16; width of vertex: 0.252; width of mesoscutum: 0.426; length of wing: 1.11; width of fore-wing: 0.502 mm.

Coloration black, moderately shining, the frontovertex and scutellum more or less opaque; mandibles brown; posterior margin of the propleura and the prepectal plates translucent yellowish; antennae black with the apex of the pedicel obscurely yellowish; legs maize yellow (R.), the hind coxae somewhat dusky at base; wings hyaline, the veins pale brownish.

Described from 94 females, 50 males (type, allotype and paratypes) reared from *Antonina indica* Green on Bermuda grass, Punahou district, Honolulu, Oahu, May 26 to July,

1919 and 1 male (paratype) reared from the same host, Kaimuki, Oahu, Feb. 2, 1919 (Timberlake). This is undoubtedly an immigrant species, and was presumably introduced with the host years ago from some part of the Orient. It belongs to what appears to be a distinctly Oriental and Australian group of *Anagyrus*.

Xanthoencyrtus Ashmead.

Xanthoencyrtus Ashmead, Canad. Entom. vol. 34, p. 302, 1902.

Scelioencyrtus Girault, Mem. Queensland Museum, Vol 4, p. 161, 1915.

Mirastymachus Girault, Journ. N. Y. Entom. Soc., vol. 23, p. 166, 1915.

Before the descriptions of the four new species of *Xanthoencyrtus* published in Part I of this paper* had appeared in print, three more were discovered on Oahu and Maui mainly through the efforts of Mr. Bridwell. It is becoming evident, therefore, that probably only a small beginning has been made in elucidating our Hawaiian species, as there is no apparent reason why each island of the group should not be represented by one or more species. Up to the present time they have found only on Laysan, Oahu and Maui, although the introduced species, *fullawayi*, occurs on Hawaii.

Our endemic species have been found chiefly if not entirely in the tussocks of *Eragrostis variabilis*, a coarse grass which grows in great profusion on the steep sides of the barren foothills, and less luxuriantly in similar rocky places within the native forests, as well as in regions at lower elevations that have much less rainfall. This grass is often infested with a species of mealybug, *Trionymus insularis* Ehrhorn, which serves as the host to these little parasites. Although *apterus* is the only species that has been actually reared, there seems to be no doubt that the others also parasitize this same mealybug

*Proc. Haw. Entom. Soc., vol. 4, No. 1, pp. 201-266, July, 1919.

with the possible exception of *laysanensis* and *semiflavus*, of whose habits we know the least at present. Not only do the different species have the same host but more remarkable still is the fact that two of these closely allied species have been found together, *semiluteus* and *bridwelli* thus occurring within a few rods of each other on the south wall of Palolo Valley. The effect of isolation, however, is shown in these species to a fine degree.

The introduced species, *fullawayi*, belongs to *Xanthocyrtus, sensu stricto,* whereas *apterus* and allies fall in the subgenus, *Mirastymachus* Girault, which differs chiefly in having three club joints instead of two. With only a few species of the two groups known outside of Hawaii (there being one European, two American and three Australian species described) the value of this character is not fully established, although it may be found necessary to recognize *Mirastymachus* as a good genus later. The main distinguishing character, moreover, obtains only in the female sex.

The following descriptions have been made comparative only, on account of the close similarity of the species to *apterus*, to the full description of which reference should be made*. The depression on the dorsal surface of the head between the eyes noted in the previous paper proves to be due to shrinkage, as this space is slightly convex in living or fresh material. Since the head in each species shrinks a little differently from other species and somewhat uniformly this character may have some value, although it is by no means absolute. Occasionally a specimen of large size will be found which remains unshrunken as is the case in the type of *semiflavus* and in one specimen of *apterus* from Kahihi, Oahu.

The following synoptic tables to the endemic species have been prepared to show their relationship to each other and to facilitate their identification.

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*Proc. Haw. Entom. Soc., vol. 4, No. 1, p. 201

FEMALES.

1. Abdomen piceous or black----------2

Abdomen orange-yellow or reddish.

Head, thorax and abdomen reddish orange, the under side of thorax and the legs paler yellow, antennae at base nearly concolorous with head but passing into piceous on the third or fourth funicle joint; head and body opaquely alutaceous; the pubescence whitish and comparatively conspicuous----------*sanguineus* n. sp.

Head and thorax pale yellow, the abdomen reddish orange, legs pale yellowish white, antennae at base concolorous with head, the funicle dusky and passing into blackish on the club; head and body very finely reticulate and somewhat shiny; the pubescence very fine and sparse and not easily seen----------*semilutcus* n. sp.

2. Head but slightly or not at all wider than long, the space between the eyes from antennal sockets to occipital margin about one-fifth longer than wide----------3

Head distinctly wider than long, the space between the eyes only one-tenth longer than wide (appearing to the eye a little wider than long.

Head and thorax ochraceous orange, antennae and legs concolorous, the club and abdomen piceous; head and body smooth and shiny, without reticulations; the pubescence dusky and rather sparse. *semiflavus* Timb.

3. Legs entirely yellowish or ochraceous, the funicle piceous or black with the first joint only sometimes yellowish----------4

Hind femora piceous, the funicle entirely ochraceous.

Head, antennae except club, thorax and legs except hind femora ochraceous orange, club and abdomen piceous or black; head and body smooth and strongly shiny; the pubescence very sparse and not easily detected; head slightly broader than long----*bridwelli* n. sp.

4. Head circular in outline, the ocelli absent.

Head, thorax, basal tergite of abdomen, legs, scape and pedicel ochraceous orange, the remainder of antennae and abdomen piceous or black; head and body smooth, without reticulations and strongly shiny; pubescence sparse and inconspicuous----*laysanensis* Timb.

Head slightly wider than long, and somewhat truncate at oral and occipital margins, the ocelli present.

Head, thorax and more or less of basal tergite of abdomen ochraceous orange, the scape and pedicel concolorous, the under side of thorax and the legs a little paler, abdomen and flagellum piceous or blackish, the first funicle joint paler or even yellowish; head and body smooth and very shiny, the mesoscutum and sometimes the head with fine reticulations; pubescence dark colored and rather sparse----------*apterus* Timb.

MALES.

1. Abdomen piceous or black----------4
Abdomen orange-yellow or reddish----------2

2. Body more or less smooth and shiny with fine reticulations; pubescence pale, sparse and not at all conspicuous----------3

Head and body opaquely alutaceous; pubescence whitish and comparatively prominent.

Head and thorax flame scarlet, the abdomen slightly redder, the underparts of thorax and the legs paler and yellower, scape and pedicel concolorous with head, the funicle and club piceous; sixth funicle joint and base of club with a row of about eight or nine clavate hairs----------*sanguineus* n. sp.

3. Head finely shagreened and nearly opaque, thorax and abdomen smooth and moderately shiny, the mesoscutum very finely reticulate, the basal tergite of abdomen somewhat more coarsely reticulate; coloration nearly uniformly capucine yellow, the legs paler yellow, the funicle and club black; sixth funicle joint and base of club with a row of about seven clavate hairs------*semiluteus* n. sp.

Head and thorax finely reticulate and shiny, the basal tergite of abdomen somewhat more coarsely reticulate; coloration about orange rufous to flame scarlet with the abdomen redder, the legs paler and more yellowish, with the funicle and club black; sixth funicle joint and base of club with a row of about six clavate hairs.
apterus Timb.

4. Head and thorax finely, delicately reticulate; ocelli distinct; mesonotum perfectly flat to apex of scutellum; head, thorax, legs, scape and pedicel about xanthine orange, the remainder of the antennae and the abdomen piceous or black; sixth funicle joint and base of club with a row of about eight clavate hairs.
bridwelli n. sp.

Head and thorax smooth and shiny, without reticulations; ocelli very minute; head, thorax, legs, scape and pedicel about capucine yellow, the funicle and club piceous, the abdomen shining black; sixth funicle joint and base of club with a row of about seven clavate hairs ----------*laysanensis* Timb.

Xanthoencyrtus sanguineus n sp. Fig. 9.

Female: In comparison with *apterus* this species differs as follows: Head practically of the same shape, the space between the eyes with about the same proportions and caving in after death very nearly the same, although the triangular raised area in the ocellar region is less prominent or even absent; ocelli practically the same in size, the posterior pair a little closer together than the distance from either to the eye-margin. Antennae longer, the scape much narrower or not over a sixth as wide as long; pedicel about the same, being distinctly

wider at apex than the following joint; the funicle joints all longer than thick, the first nearly twice as long as thick, the sixth about a third longer than thick; club longer but keeping the same proportion to the preceding joints, and the relative proportion of its own joints to each other practically the same. Thorax nearly as in *apterus*, the posterior margin of pronotum gently or deeply, irregularly arcuate, the degree depending apparently on shrinkage, the mesoscutum consequently appearing either transverse or triangularly prolonged medially; scutellum not broadly rounded at apex but rather acute; abdomen shorter or not much longer than the head and thorax combined when the former is stretched forward; ovipositor distinctly although shortly protruded. Sculpture differing remarkably, the head, dorsal surface of the thorax and the abdomen being extremely finely reticulate and producing an opaquely alutaceous effect or not at all shiny as in *apterus*. The whitish pubescence is also much more abundant and conspicuous than in *apterus* and other Hawaiian species, although by no means so conspicuous as in species of *Aphycus, Blastothrix* or some species of *Anagyrus*.

Length: (0.78 to) 1.20 (with head stretched forward); width of vertex: 0.214; width of mesoscutum: 0.285 mm.

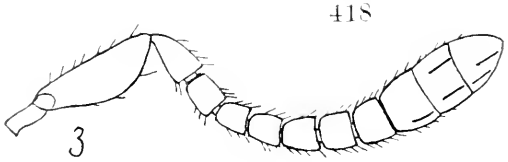
Coloration nearly uniformly bittersweet orange (R.), the under side of the thorax and the legs considerably paler and yellowish, the scape and pedicel nearly concolorous but a little browner, the basal two or three joints of funicle usually dusky yellowish or more rarely dilute piceous, the remainder of funicle and the club piceous or black.

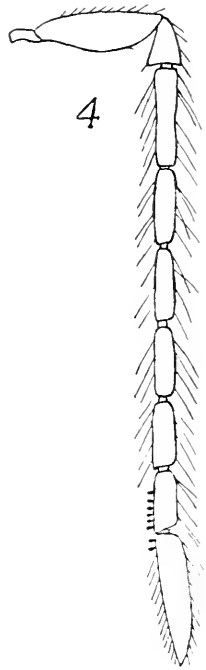
Male: Similar to the male of *apterus* but the scape is much narrower, the last funicle joint and base of club with a row of about eight or sometimes nine clavate hairs; thorax differing as in the female, the abdomen ovate and a little shorter than the thorax. Sculpture as in the female except that the apical half of the first tergite of the abdomen and the intermediate tergites have close set, microscopic lineolations longitudinally arranged, thus producing an effect as if covered with extremely minute, glistening scales. Pubescence a little more prominent than in the female.

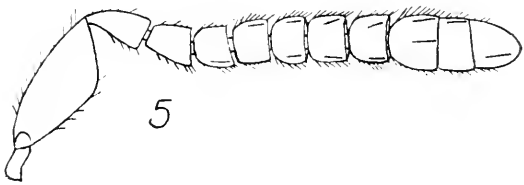
Length: (0.50 to) 0.89; width of vertex: 0.216; width of mesoscutum: 0.299 mm.

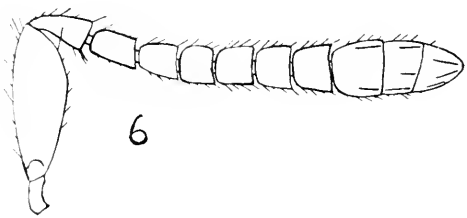
Coloration about flame scarlet (R.), or slightly darker, the abdomen a little redder, the lineolate area appearing golden yellow in most aspects, the underparts of the thorax and the legs a little paler and yellower; scape and pedicel concolorous with the head, the funicle and the club piceous.

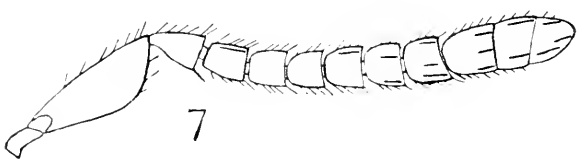
Described from 20 females, 41 males (type, allotype and paratypes) collected on *Eragrostis variabilis* on the north wall of Iao Valley, Maui, about one-half mile from the Needle, July 6, 1919 (Timberlake).

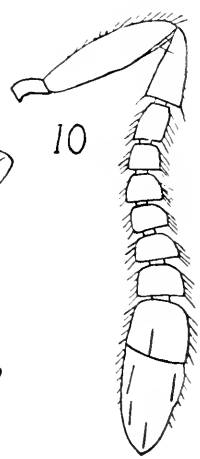


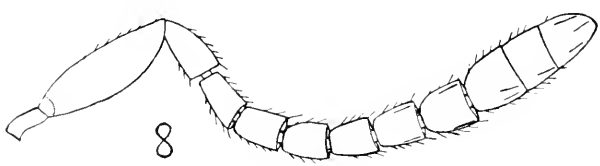


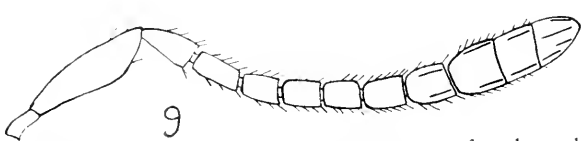












Figs. 3 and 4, *Xanthocncyrtus apterus*, female and male antenna.
Fig. 5, *Xanthocncyrtus laysanensis*, female antenna.
Fig. 6, *Xanthocncyrtus semiflavus*, female antenna.
Fig. 7, *Xanthocnsyrtus bridwelli*, female antenna.
Fig. 8, *Xanthocncyrtus semilutens*, female antenna.
Fig. 9, *Xanthocncyrtus sanguineus*, female antenna.
Fig. 10, *Xanthocncyrtus fullawayi*, female antenna.

Xanthoencyrtus semiluteus n. sp. Fig. 8.

Female: From *apterus* differing structurally as follows: Head nearly of the same shape but the eyes considerably smaller so that the space between them from the antennal sockets to the occipital margin is only one-tenth longer than wide (by micrometer measurement), appearing to the eye a little wider than long, and therefore practically as in *semiflavus* although the space is sunken in after death as in *apterus;* ocelli rather more minute, although more prominent by their contrast in coloration with background, the posterior pair considerably more remote from the eye-margins than their distance apart; antennae nearly as in *sanguineus*. Thorax nearly as in *apterus*, the posterior margin of pronotum more gently arcuate, the mesoscutum more transverse and somewhat over twice as wide as its median length, the scutellum broadly rounded at apex. Abdomen conspicuously large, over twice as long as head and thorax combined or rather larger and longer than in *apterus*, the ovipositor shortly protruded. Head, thoracic notum and basal tergite of abdomen very minutely reticulate, the surface considerably more shiny than in *sanguineus* but much less so than in *apterus*. Pubescence very fine and sparse on head and thorax and not easily detected.

Length: 1.17 (with head nearly vertical); width of vertex: 0.216; width of mesoscutum: 0.278 mm.

Head and base of antennae buff yellow (R.), the antennae gradually shading into piceous beginning at the middle of the funicle; thorax maize yellow (R.), the underparts paler, the mesopleura especially being yellowish white; legs nearly maize yellow but paler at base; abdomen about salmon orange (R.).

Male: Structuraly much like the male of *apterus* but the eyes are a little smaller, with the space between wider, the posterior pair of ocelli a little more remote from the eye-margin than their distance apart; scape of antennae narrower, the sixth funicle joint with a row of about five clavate hairs and the base of the club with two or three more; thorax differing as in the female; abdomen ovate, as long as the thorax. Head very finely shagreened and opaque, the thorax sculptured as in the female, the basal tergite of abdomen more coarsely reticulate than in the female, although somewhat more finely than in *apterus;* thorax and abdomen both much less shiny. Pubescence much more abundant than in the female, but not contrasting in color with the body, and rather more abundant than in the male of *apterus*, although less easily seen.

Length: (0.68 to) 0.865; width of vertex: 0.214; width of mesoscutum: 0.285 mm.

Coloration nearly uniformly capucine yellow (R.), the scape and pedicel about concolorous, the funicle and club black, the legs paler or about light orange yellow (R.); in two of the paratypes the coloration is much redder but apparently due to discoloration.

Described from 1 female, 3 males (type, allotype and paratypes) collected on *Eragrostis variabilis* on the south wall of Palolo Valley, Oahu, May 30, 1919 (J. C. Bridwell) and 1 male (paratype) on the same grass on the side of the southernmost ridge of the Koolau Range, Oahu, Nov. 16, 1919 (Bridwell).

Xanthoencyrtus bridwelli n. sp. Fig. 7.

Female: Head slightly wider than in *apterus* in proportion to the length, the space between the eyes a little wider, the ocelli more minute and indistinct, the space separating the posterior pair from the eye-margins distinctly greater than their distance apart; the space between the eyes caved in after death much as in *apterus* but the triangular raised area in the upper part much less prominent and forming anteriorly a right angle instead of an acute angle. Antennae a little stouter, the scape a trifle wider, the funicle stouter so that the pedicel at apex is hardly thicker than the following joint, the first funicle joint somewhat longer and the sixth somewhat wider, the latter being a little wider than long. Thorax practically as in *apterus*, the abdomen apparently somewhat smaller, the ovipositor slightly protruded. Head, thorax and abdomen very smooth and shiny, with no reticulations apparent in any part. Pubescence very sparse and not easily detected.

Length: (0.79 to) 1.32 (with head stretched forward); width of vertex: 0.235; width of mesoscutum: 0.273 mm.

Head and thorax ochraceous orange (R.), the scape and pedicel concolorous, the funicle ochraceous buff (R.), the club piceous and often paler or yellowish at base; legs slightly paler than the body, the hind coxae and femore except at apex and sometimes the middle coxae more or less piceous; abdomen shining black.

Male: Much like the male of *apterus* but the head is wider with the space between the eyes much broader, the ocelli more minute and closer together so that the distance from either of the posterior pair to the eye-margin is considerably greater than their distance apart; scape practically the same, the sixth funicle joint and base of club with a row of about eight clavate hairs arranged five and three on each respectively; thorax similar, the scutellum flat from base to apex; abdomen triangularly to broadly ovate, depending much on manner of drying after death, as long or a little longer than thorax. Head and notum of thorax extremely finely and delicately reticulate, appearing smooth and shiny; basal tergite of abdomen much more distinctly and coarsely reticulate than on the head or thorax, and slightly more finely and more uniformly as to size than in *apterus*. Pubescence very sparse and fine.

Length: (0.55 to) 0.88; width of vertex: 0.216; width of mesoscutum: 0.254 mm.

Coloration of head, thorax, scape and pedicel about xanthine orange (R.), the legs concolorous with the front coxae and all the tarsi paler; flagellum of the antennae and the abdomen piceous or black.

Described from 15 females, 12 males (type, allotype and paratypes) collected on *Eragrostis variabilis* on the south wall of Palolo Valley, Oahu, May 30, 1919 (J. C. Bridwell), and 1 female, 1 male (paratypes) on the same grass at Koko Head, Oahu, 25 ft. elevation, Dec. 15, 1918 (Giffard and Muir).

Xanthoencyrtus apterus Timb. Figs. 3, 4.

Xanthoencyrtus apterus Timberlake. Proc. Haw. Entom. Soc., vol. 4, p. 201, July, 1919.

The following additional material of this species has been collected: 23 females, 16 males on *Eragrostis variabilis*, ridge west of Kalihi Valley (about 1000 ft.), Oahu, June 15, 1919 (Bridwell and Timberlake), nearly one-half of the specimens having been reared from the mealybug, *Trionymus insularis* Ehrhorn, June 17-30, one to three issuing from a host; and 4 females, 11 males on *Eragrostis variabilis*, Manoa Ridge, Oahu, June 1, 1919 (J. C. Bridwell).

The Kalihi specimens are nearly identical with the types from Nuuanu Pali, but the coloration of the females is somewhat paler and without the trace of tawny which may have been due to discoloration in the types. In both series the color is more ochraceous orange (R.) than yellow ocher. The first funicle joint varies considerably in the amount of yellowish coloration and in one female is entirely black; the base of the abdomen is likewise variable, some specimens having the first tergite entirely pale but in one female it is entirely black. In the males the coloration is about orange rufous to flame scarlet (R.).

The Manoa specimens are distinguished by a fine reticulation on the head of the female and by a considerably greater number of dark-colored, minute, bristle-like hairs on the mesoscutum, but the coloration is practically as in the Kalihi specimens.

In the original description, p. 202, line 4, the following correction should be made, for "the latter" read "occipital margin." The ovipositor in this and probably in all the Hawaiian species is hidden in repose, but in most mounted specimens the abdomen is more or less distorted, somewhat in the manner assumed during oviposition so that the ovipositor and sheaths are shortly protruded. The latter are flat and laminate, broader at base and tapering to a blunt point. The abdomen of the male usually remains oval-shaped after drying or not flattening out wider than the thorax and becoming rotund as in the allotype specimen.

Coelopencyrtus orbi n. sp. Figs. 11-13.

Female: Similar to *Coelopencyrtus odyneri* but the head is distinctly wider than long, instead of nearly as long as wide, the face and cheeks shorter, the oral margin of face hardly produced medially; frontovertex wider or about twice as long as wide, slightly widening behind the ocelli but hardly at all anteriorly, the ocelli in an equilateral triangle, the posterior pair not more than their own diameter from the occipital margin. Antennae a little shorter and stouter, the pubescence more prominent and bristle-like, the scape distinctly wider, the funicle joints more transverse but keeping practically the same relative proportion to each other. Sculpture of the same type, although somewhat coarser, especially on the frontovertex and scutellum, the pin-punctures of the frontovertex more prominent. Pubescence much sparser, the eyes bare, the mesonotal bristles not more than one-half as numerous, there being about sixteen along the anterior margin of the mesoscutum and ten along the posterior margin.

Length: (1.00 to) 1.38; width of vertex at ocelli: 0.164; width of mesoscutum: 0.473; length of fore-wing: 1.13; width of fore-wing: 0.490 mm.

Coloration much as in *odyneri* but the mesoscutum does not have the brassy reflections, the scutellum is more metallic with a dark purplish luster, more greenish toward the sides; legs almost entirely black, but the middle tibial spur is yellowish and the tarsi are more or less yellowish or yellowish brown beneath and varying from brown to fuscous above but always blackish at apex of the last joint. Wings more deeply stained, being darker on the basal half and with a distinct fuscous streak at the base along the posterior margin.

Male: Head with the same remarkable structure as in *odyneri* but thinner fronto-occipitally, being only twice as thick above as at the oral margin, and as seen from in front it is no longer than wide and more nearly circular; frontovertex no longer than wide, the frons less protuberant and projecting less in front of the eyes; ocelli in a right-angled triangle, the anterior ocellus just reaching to a line drawn across the anterior margin of the eyes, the posterior pair hardly more than their own diameter from the occipital margin. Scape (Figs. 12, 13) as wide as in *odyneri* but more nearly like *szczcyi* in shape, the upper margin being curved arcuately inward, the lower margin evenly and strongly convex; pedicel with a large conical projection at base on the upper side, otherwise about a third longer again than thick; first funicle joint as wide as long, narrowed somewhat towards the base but not remarkably modified as in *odyneri* or *szczcyi*, following funicle joints all transverse, about equally long and increasing slightly in width distad; club as long as the last three funicle joints combined, considerably wider than the funicle and not strongly inclined as in *odyneri*.

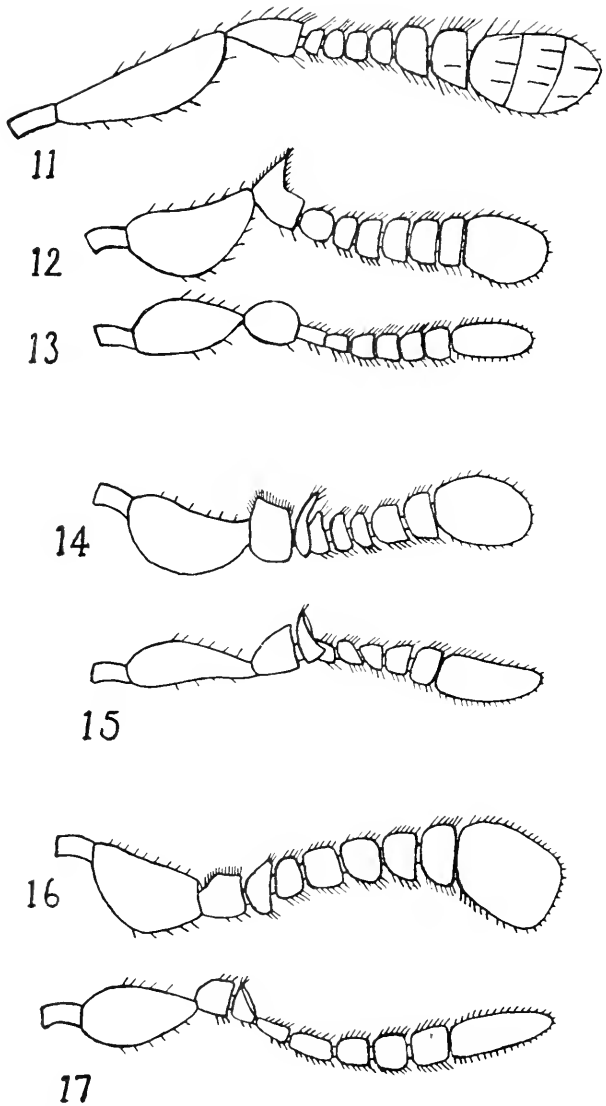


Fig. 11, *Coelopencyrtus orbi*, female antenna.
Figs. 12 and 13, *Coelopencyrtus orbi*, two aspects of male antenna.
Figs. 14 and 15, *Coelopencyrtus szczcyi*, two aspects of male antenna.
Figs. 16 and 17, *Coelopencyrtus odyneri*, two aspects of male antenna.

Lower part of face above antennae with a median carina which widens out above and dissipates a little above the level of the lower corners of the eyes, the subquadrate, shallow, scrobal depression on either side of this carina, limited outwardly at the corners by the antennal socket and margin of the eye, with a smooth and shining surface, and shows no trace of the dense shagreening present in *odyneri* or *szecsyi* except to a comparatively very slight extent around its outer and upper margin; upper part of the face above the scrobes much more shagreened than in *odyneri* and less shiny, the surface being distinctly and finely reticulate, and with numerous minute setiferous punctures practically as in *odyneri*, although less prominent; frontovertex more distinctly shagreened, with the lines arranged fingerprint-like between and behind the ocelli; the setiferous punctures somewhat more prominent and mostly confined to the frons; sculpture otherwise as in the female.

The suberect pubescence on the frontovertex and upper part of face somewhat thinner than in *odyneri*, the tuft of fine pubescence on the pedicel confined to the conical projection, the funicle joints with coarser hair; eyes with very sparse, short, erect hairs; pubescence on other parts of the body differing from *odyneri* as described for the female.

Length: (1.08 to) 1.23; width of vertex at posterior ocelli: 0.216; width of mesoscutum: 0.443 length of fore-wing: 1.03; width of fore-wing: 0.483 mm.

Coloration as in the female except that the antennae are slightly more brownish.

Described from 213 females, 9 males (type, allotype and paratypes) reared from two larvae of *Odynerus orbus* Perkins, Kipuka Puaulu, Kilauea, Hawaii, Nov. 21 and Nov. 28-29, 1919 (F. X. Williams), and 2 females (paratypes) found alive in a sealed cell of this *Odynerus* at the same locality, Nov. 1, 1919 (Williams). From the first larva there issued 2 ♂♂, 124 ♀♀, and from the second 6 ♂♂, 104 ♀♀, this brood being incomplete as about 35 pupae were killed by Acari.

Xesmatia n. g.

Closely related to *Oencyrtus* Ashmead and differs in the female sex as follows: Head of the same shape and structure, although slightly thinner fronto-occipitally, antennae similar but the club somewhat larger; mandibles differing considerably in having three teeth, none very acute, the middle one much the largest, the upper and lower teeth both rather obscure, giving the appearance of a broad apex with a single median

tooth (in *Ooencyrtus* the mandible has an acute ventral tooth and a broadly truncate inner one); palpi practically the same, the maxillary pair with four short, nearly equal joints, the labial pair with two subequal, short joints.

Thorax similar, the axillae well separated at their tips as in *Ooencyrtus;* the scutellum a little larger and broader with the apex more rounded. Wings nearly the same, the marginal vein punctiform, the stigmal somewhat shorter than in *Ooencyrtus* and triangularly enlarged from base to apex with a short spur at apex projecting towards the costal margin; discal and marginal ciliation similar, the speculum however, greatly widening below. Legs similar, the middle tarsi slenderer and less strongly tapering towards the apex; the middle tibial spur slender and as long as the first tarsal joint.

Abdomen considerably smaller, after drying no longer than half the thorax and as wide, being much broader than long and well rounded at apex; the dorsum beyond the first tergite caving in after death in a peculiar manner, the venter, however, not compressed but broadly rounded from side to side in the form of nearly a semicircle near the base of abdomen; vibrissal plates situated on either side of the dorsum about half way between the base and apex and withdrawn within the dorsal concavity, the vibrissae consequently difficult to trace but reaching to the apex.

In sculpture differing appreciably, the surface of all parts of the head and body much smoother and shinier, for although fine, delicate reticulations occur on the head and mesoscutum, they do not produce a shagreened appearance as in *Ooencyrtus*, the scutellum, moreover, entirely smooth and polished; pubescence of the same character as in *Ooencyrtus.*

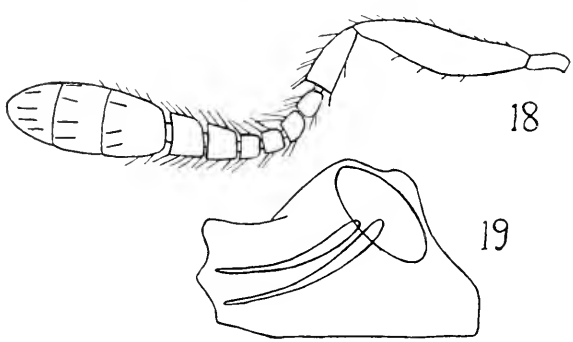
Genotype: *Xesmatia flavipes* n. sp.

Xesmatia flavipes n. sp. Figs. 18, 19.

Female: Head moderately thin fronto-occipitally, somewhat broader than long, being thickest and widest across the middle of the eyes, the dorsal surface well rounded from side to side; frontovertex occupying about one-third of the width of the head in dorsal view, about a third longer again than wide and becoming somewhat wider behind the ocelli; the latter in a right-angled triangle, the posterior pair somewhat less than one-half their own diameter from the eye-margins and about twice as far removed from the occipital margin; eyes very broadly oval or but little longer than wide, the inferio-posterior margin much less curved than the inner margins; cheeks somewhat shorter than the width of the eyes and rather strongly curved in towards the mouth as seen from in front; face nearly as wide as long, the scrobes in the form of a moderately deep, broadly ovate depression covering its larger part, reaching upward between the eyes to the anterior limit of the frons, and divided by a rather wide longitudinal ridge which runs about two-thirds of the length of the depression from the antennal sockets up-

ward. Antennae inserted rather close to the oral margin and well separated by the facial ridge, the distance between the sockets being about one-fourth less than the width of the frons; scape compressed linear, slightly widened at the middle and excluding the radicle about four times longer than wide; pedicel thicker at apex than the basal funicle joints and nearly as long as the first three of these combined; funicle increasing gradually in width distad, the first four joints subequal in size, the first being slightly longer than thick, the fourth slightly thicker than long, last two funicle joints larger and subquadrate; club large, oval, practically as long as the entire funicle and twice as wide as the preceding joint, its first joint distinctly longer than either of the following two.

Thorax strongly convex above, yet somewhat wider than its depth; pronotum strongly arcuate, the visible part very short; mesoscutum more than twice as wide as long, its basal margin slightly produced



Figs. 18 and 19, *Nesmatia flavipes*, female antenna and mandible.

medially in a broad curve between the tips of the axillae; the latter rather small, distinctly separated medially and about twice as wide as long; scutellum large, strongly convex throughout, the apex well rounded, the lateral margins but little elevated and hardly declivous; propodeum very short medially, but triangularly enlarging at the sides, the metapleura small. Wings reaching far beyond the apex of abdomen and about normal in width; the disk finely, closely ciliated, the area below the submarginal vein with coarser, longer cilia arranged in about five oblique, transverse rows and with a sixth row parallel and close to the vein; marginal vein falling somewhat short of the middle of the disk; speculum not quite reaching to the stigmal vein, greatly and triangularly widening below, and above on the distal side where it becomes suddenly narrowed with parallel sides it is guarded by a row of five cilia, which are hardly longer than others of the disk but much thickened at base; submarginal vein set with about twelve moderately long, slender bristles.

Cheeks and mesopleura with microscopic reticulations faintly im-

pressed; prepectal plates and sides of the scrobal impression of the face more evidently and somewhat more coarsely reticulate; mesoscutum and base of the scutellum more faintly and minutely reticulate; facial ridge and most of the scutellum almost perfectly smooth and highly polished; frontovertex smoothish and with a few scattered minute pin-punctures; abdomen smooth and shiny, apparently without reticulations; the reticulations of all parts of the body are so faint that the general effect is of a smooth and polished surface except possibly on the sides of the scrobal impression and on the prepectal plates. Pubescence consisting of fine, brownish colored hairs of moderate length, rather sparse on the cheeks and frontovertex and moderately abundant on the mesoscutum; scutellum with only about a dozen such hairs on the basal half and two longer, more bristle-like hairs at apex; abdomen sparsely pubescent along the lateral and apical margins; pile of the eyes rather sparse and short; antennae with the usual vestiture of bristle-like hairs, most abundant on the pedicel and funicle, the club with considerably shorter, more erect hairs, which are abundant even to the apex.

Length: (0.74 to) 0.75; width of vertex at posterior ocelli: 0.143; width of mesoscutum: 0.308; length of fore-wing: 0.938; width of fore-wing: 0.431 mm.

General coloration metallic bluish black, the cheeks with a greenish luster, the frontovertex with a comparatively dull, bluish luster; mesoscutum with a strong blue and scutellum with a refulgent bluish green luster; pleura nearly pure black; luster of abdomen slightly greenish and partly iridescent especially on the basal tergite. Scape yellow ocher (R.), the flagellum yellowish brown, the upper side of pedicel and the club darker brown (the rest of the pedicel and the funicle when mounted in balsam appearing nearly as yellowish as the scape). Front legs nearly fuscous, yellowish only at the knees and apex of the tibia, the tarsi brown; middle and hind legs mostly yellow ocher (R.), but somewhat brownish along the upper margin of the femora and near the base of the tibiae on the upper side, the last joint of the tarsi brown. Wings hyaline, faintly tinged with brownish around the stigmal vein and along the posterior margin at the base; the veins brownish yellow.

Male: Not known.

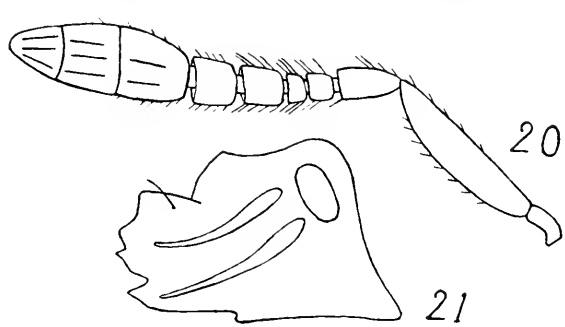
Described from one female (type) collected on or near the rim of Palolo Crater, Oahu, Dec. 20, 1918 (J. C. Bridwell) and one female (paratype) collected at the head of Waianae Valley, Oahu, about 2400 ft. elevation, June 1, 1919 (Timberlake).

This species may possibly be endemic, but we can have no positive evidence on this point until the species is reared.

On account of its small size and close relationship to *Oocencyrtus* it may prove to be an egg-parasite.

Plagiomerus hospes n. sp. Figs. 20, 21.

Female: Head considerably wider than long, the face abruptly inflexed from the horizontal frons, moderately thick above but becoming much thinner toward the mouth; occiput but slightly concave, the margin above rather acute; dorsal surface of head strongly convex; eyes mostly dorsal but the anterior margin reflexed on to the plane of the face rather more widely than in *Plagiomerus diaspidis* Crawford*, also larger than in that species, and in the form of a nearly equilateral triangle with the inner margins straighter and parallel; frontovertex comparatively narrow, apparently somewhat over twice as long as wide, the ocelli in a right-angled triangle with the posterior pair practically touching the eye-margins and rather remote from the occipital margin; cheeks about equal to the length of the eyes and arcuately converging towards the mouth; face broad, the scrobes in the form of a triangular, rather deep depression, reaching upward between the eyes to the anterior margin of the frons, separated on either side from the eye-margins by a convex rather wide space and divided on the lower three-fourths of its length by a rounded, triangularly shaped ridge broadest between



Figs. 20 and 21, *Plagiomerus hospes*, female antenna and mandible.

and somewhat below the antennal sockets. Antennae inserted slightly less than half way from the oral margin to a line connecting the lower corners of the eyes, the sockets widely separated by the facial ridge, their distance apart a little less than the distance from either to the nearest point of the corresponding eye; scape rather long and reaching slightly beyond the plane of the frons, compressed but linear, the lower margin somewhat convex; pedicel a little wider at apex than the following

*The head in all available specimens is much shrunken so that this difference may be illusory.

joint, and somewhat longer than the first two funicle joints combined; funicle moderately increasing in thickness distad, the first joint about as wide as long, the second shorter and transverse, the last two much larger, the third being as wide as long and the fourth slightly transverse; club large, elongate oval and pointed at apex, considerably wider than the funicle and almost as long as the pedicel and funicle combined, its first joint the longest and the apical one a little the shortest. Mandibles with a short sharp spine on the ventral margin, the apical margin not greatly narrower than the base, with an acute ventral tooth rather deeply divided from the remaining edge, which is obliquely inclined and divided into three short rather acute teeth. Palpi short and transparent white; the maxillary pair four-jointed, with the apical joint considerably the longest, the middle joints subequal and about as long as wide, the basal joint about two-thirds as long as the apical; labial pair short, wide at the middle and tapering to either end, the basal joint slightly longer than the second.

Thorax strongly depressed and not very deep, about a fourth longer than wide; pronotum strongly arcuate; mesoscutum nearly twice as wide as long, its posterior margin slightly angulate at the middle; axillae fully twice as wide as long, being narrowly transverse and meeting at their tips; scutellum a little wider across the base than its length, the apex forming an angle of about 90 degrees, the disk flat, not much elevated and sloping downward around the apical margin; propodeum very short medially, triangularly enlarging towards the sides, the metapleura small. Abdomen depressed with the dorsum slightly sunken in after death, the outline as seen from above subtriangular with the basal corners and apex rounded, the length and width about equal to the thorax; fifth ventrite reaching only to the middle of the venter leaving the ovipositor free beyond this point, the sheaths shortly protruded, slender, terete and abruptly tapering at apex.

Legs of normal structure, the middle tibial spur very slender and tapering, almost as long as the first tarsal joint which is equal to the following four joints combined. Wings reaching far beyond the apex of abdomen and moderately narrow; disk moderately densely ciliated but more sparsely and coarsely in the angle between the speculum and submarginal vein, much of the rest of the basal area with finer and transparent cilia, the extreme base bare; speculum narrow, reaching practically to the posterior margin and separated from the hairless streak along the margin by only one row of transparent cilia, much narrowed above and falling considerably short of the venation; apex of venation not quite reaching to the middle of the wing, the submarginal vein somewhat enlarged before its apex although not so distinctly as in *diaspidis*, the marginal vein about five times as long as thick and considerably longer than in *diaspidis*, the postmarginal and stigmal veins about equal, each nearly a third as long as the marginal, the stigmal triangular, narrow at the base and enlarged at apex.

Face finely reticulate, more delicately and a little more finely on the

median ridge and changing to very closely lineolate on each side exterior to the antennal sockets and on the cheeks; vertex much more finely but more rugosely reticulate, gradually becoming almost smooth on the frons, an orbital row of very fine, shallow pin-punctures on each side of the frontovertex, and a few scattered over the frons; mesoscutum distinctly reticulate with the lines running transversely; axillae transversely lineolato-reticulate; scutellum with crowded, microscopic thimble-like punctures appearing granular at lower magnifications and opaque in most aspects, the obliquely sloping latero-apical margin smooth and highly polished; metanotum and propodeum smooth, the metapleura highly polished; mesopleura finely reticulate with the lines running mostly lengthwise; abdomen smooth and shiny, the apical tergite, however, rather rugosely reticulate except on the sides. (*Diaspidis* has a smoother face with the reticulations indistinct except on the facial ridge, and the thimble-like punctures of scutellum appear to be slightly coarser).

Eyes with very sparse and extremely short pile; pubescence on other parts of head also short and sparse, yellowish white in color and confined to the frontovertex and lower part of the face; that on the thorax blackish and rather sparse and short on the mesoscutum, much longer on the scutellum and more bristle-like especially towards the apex, the four scale-like bristles at the apex very narrow and all nearly equal in length (in *diaspidis* these bristles are comparatively wide with the anterior pair much the shorter); pubescence on the basal corners of the propodeum, the sides of the abdomen and on the protruded part of the ovipositor sparse, fine and pale-colored.

Length: (0.80 to) 1.03; width of vertex at the anterior ocellus: 0.101; width of mesoscutum: 0.433; length of fore-wing: 1.03; width of fore-wing: 0.436; length of protruded part of ovipositor: 0.113 mm.

General color metallic bluish black, the luster of head bluish, becoming purplish on the sides of the face and greenish on the facial ridge; luster of thorax mostly bluish or bluish-green and slightly purplish in part, the scutellum usually appearing dull black, its apex, however, the lateral margins as well as the metapleura brilliant metallic green and brassy; abdomen brilliant metallic green on the first tergite and lateral margins near apex, the remainder with various metallic reflections but usually dark purplish and bronzy. Basal half of the scape, pedicel except at apex, first two funcle joints and club black; the rest of scape, apical third of pedicel and last two funicle joints yellow. Legs mostly yellowish white with the front and hind coxae and femora except at base black, the middle femora with a narrow black ring just before the apex and rather indistinct on the under side; front tibiae with a black ring reaching about to the middle, the base narrowly white; a similar ring on the middle tibiae only slightly wider than the preceding white base and falling considerably short of the middle; hind tibiae with a broad black ring reaching a little beyond the middle and leaving the base narrowly white; the tarsi slightly more yellowish

beneath, and the tip of the last joint blackish. Wings hyaline, the veins yellowish but the stigmal and the submarginal except at base and apex are much more transparent than the rest of the venation.

Male: Not known.

Described from four females (type and paratypes) collected at Nuuanu Pali, Oahu, Oct. 19, 1919 (W. M. Giffard).

This species is very similar to *Plagiomerus diaspidis* Crawford but can be distinguished by the nearly bare eyes, the narrower wings and frontovertex and by the slender lamelliform bristles on the scutellum. The coloration is similar but the black band on the middle femora is much narrower.

The host of *hospes* is unknown but judging from the habits of other members of the genus it should prove to be a Diaspine scale. The species is no doubt immigrant and presumably came from some part of America as the genus has not been recognized hitherto outside of North America. As no males of *Plagiomerus* have been discovered it is becoming apparent that the species are thelyotokous and maleless under ordinary circumstances.

Anabrolepis n. g.

Female: Head as seen from the side distinctly triangular and as seen from above almost perfectly semicircular in outline; the dorsal surface much flattened especially in the longitudinal axis, its plane forming an acute angle with the strongly obliquely inclined ventro-anterior surface although the angulation is somewhat rounded off; eyes and frons not entirely dorsal but continued distinctly beyond the angulation on to the ventro-anterior surface; anterior orbits of the eyes with a distinct but narrow furrow continuous across the face between the eyes, thus marking the anterior boundary of the frons and lined throughout with silvery white, short and recumbent hairs. Antennae rather short and stout, the scape compressed and a little widened towards the apex, the pedicel rather short and thick, the funicle six-jointed with the joints mostly transverse, the club slightly longer than the funicle.

Thorax depressed, the mesoscutum being very flat; scutellum a little wider than long, at apex nearly rectangular and without any bristles. Abdomen triangular as seen from above, a little narrower than the thorax and about as long, the ovipositor shortly protruded. Wings nar

row, marked with a longitudinal fuscous band and several rays along the margin alternating with hyaline spots; marginal vein stout and about four times as long as thick although much obscured by numerous strong bristles, the stigmal vein about one-half as long, the postmarginal short and spur-like.

Male: Not known.

Genotype: *Anabrolepis extranea* n. sp.

This genus is closely allied to *Habrolepis* Förster and *Adelencyrtus* Ashmead, but is distinguished from the former by the absence of lamelliform bristles on either the vertico-occipital margin or apex of the scutellum and by the different wing pattern, and from *Adelencyrtus* by the flattened dorsal surface of the head, which is more acutely angled with the anterior surface, and by the fuscous rays on the wings. The European species, *Encyrtus zetterstedtii*, hitherto placed in *Habrolepis* no doubt belongs here and may be known as *Anabrolepis zetterstedtii* (Westwood).

The following analysis of the described *Habrolepis*-like genera while not entirely satisfactory, because prepared in part from descriptions only, may help the student to distinguish these interesting forms. It is rather significant that of the seven genera three are represented in Hawaii by an immigrant species. This relatively high proportion is probably due to the fact that the species are parasitic in common and frequently transported scale-insects, and secondly that thelyotokous reproduction is apparently the rule in the group and thus their establishment in a new locality is made comparatively easy.

Characters common to the group of *Habrolepis*-like genera: Head triangular in side view with the face strongly reflexed, the planes of the face and frons meeting in a more or less acute angle; antennae simple and usually moderately clavate, the funicle with four or six joints; mandibles much flattened or not curved inward at apex, the ventral margin with a strong preapical spine, the apex not greatly narrower than the base, and armed with an acute ventral tooth and an obliquely inclined inner margin variously subdivided into two to four additional teeth; the vertico-occipital margin ornamented in three genera with a pair of lamelliform bristles, the scutellum in four genera with one or two pairs of similar but usually wider bristles.

Females.*

1. Funicle six-jointed ----------4

   Funicle four-jointed.

   Scutellum with one or two pairs of lamelliform bristles at apex---2

   Apical bristles of scutellum not modified.
   Marginal vein thrice as long as wide, the stigmal and portmarginal subequal and about two-thirds as long as the marginal; mandibles with small, subacute teeth; wings hyaline with a fuscous area beneath the apex of venation----------*Parahomalopoda* Girault

2. Dorsal surface of the head flattened or only slightly convex from side to side; the vertico-occipital margin with a pair of slender lamelliform bristles, the apex of scutellum with one pair of wider bristles; wings with fuscous rays from a median longitudinal band ----------3

   Dorsal surface of head convex with the eyes almost wholly dorsal; the face inflexed but meeting the plane of the frons in a broad curve, the scrobal impression triangular limited above by a semicircular rounded ridge just in front of the eyes; vertico-occipital margin rather acute and with a pair of simple bristles, the scutellum with two pairs of lamelliform bristles; wings hyaline--*Plagiomerus* Crawford

3. Antennae slender, the scape not expanded beneath, the funicle joints longer than thick----------*Homalopoda* Howard

   Antennae short and stout, the scape dilated towards the apex, the funicle joints much wider than long and subcompressed.
   Pseudhomalopoda Girault

4. Scutellum without specialized bristles at apex----------5

   Scutellum with a pair of broad lamelliform bristles at apex.

   Face very strongly reflexed, vertico-occipital margin with a pair of lamelliform bristles; antennae slender or but weakly clavate; wings fuscous with a pair of hyaline spots beyond the venation and a subapical, hyaline cross-band----------*Habrolepis* Foerster

5. Dorsal surface of the head flat or only slightly rounded from side to side, and semicircular in outline, the anterior surface sharply reflexed although the angulation is somewhat rounded off; eyes and frons not entirely dorsal but distinctly reflexed on to the anterior surface; anterior orbits of the eyes with a silvery pubescent, narrow furrow continuous across the face; wings with fuscous rays from a median longitudinal band----------*Anabrolepis* n. g.

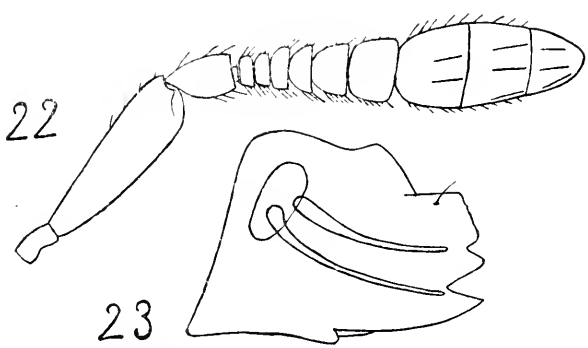
---

*The male has been described only for genus *Habrolepis*. It has two short ring-like funicle joints and an elongate cylindrical club.

Dorsal surface of the head strongly convex and broadly crescentic in outline, the anterior surface less sharply reflexed and the angulation strongly rounded off in a broad curve; anterior orbits of the eyes not furrowed and without a silvery pubescent line; wings hyaline or faintly fuscous with two triangular hyaline areas forming a cross-band just beyond the venation---*Adelencyrtus* Ashmead

Anabrolepis extranea n. sp. Figs. 22, 23.

Female: In side view of the head the facial side of the triangular outline is the longest, the dorsal and occipital sides nearly equal and forming a right angle; in frontal view the head is much wider than long, the outline of the eyes and frons forming a semicircle; occiput wider than long, not much concave, the neck inserted above the center; eyes triangular, the inner side slightly longer than the posterior, the anterior side still longer and on the ventro-anterior surface of head; frontovertex considerably widening posteriorly and nearly twice as long as the



Figs. 22 and 23, *Anabrolepis extranea*, female antenna and mandible.

posterior width when the anterior, reflexed part of frons is counted in, the occipital margin rather acute and without bristles; ocelli arranged in a small equilateral triangle placed in the middle of the dorsal part of the frontovertex, the anterior ocellus considerably in front of the middle, the posterior pair a little behind the middle, about one-half their own diameter from the eye-margin and very remote from the occipital margin; cheeks as long as the posterior margin of the eyes and arcuately converging towards the moderately wide mouth; face wider than long, flattened and impressed with a median scrobal depression, divided by a short median rounded ridge and bounded above by a rather broad convex space which forms a broad curve or semicircle between the depression and the eyes, the grooved pubescent line at the orbits also in the form of a semicircle, the oral margin with a broad, deep median sinus. Antennae inserted rather far apart, the space between the sockets equaling the width of the frons, and rather far above the oral margin or just below a line drawn between the lower corners of

the eyes, with upper ends of the sockets almost touching this line; scape subcompressed, wider towards the apex or clavate in outline as seen from the side, and rather short or barely reaching to the plane of the frontovertex; pedicel about one-half longer than thick, much thicker at the apex than the following joint and a little longer than the first three funicle joints combined; flagellum short, distinctly but not greatly clavate; first four funicle joints all short, transverse and about equal in length, the last two funicle joints twice as long as the preceding joints, the fifth about as long as its apical width, the sixth a little wider than long; club narrowly ovate, rounded at apex, considerably wider and a little longer than the funicle, its basal joint somewhat the longest. Mandibles with a sharp spine on the ventral margin, the apex broad, with two strong acute, ventral teeth and a broad inner truncate margin. Maxillary palpi slender, moderately long, the basal joint a little longer than the second or third which are about equal, the fourth joint as long as the first two combined; labial palpi short and stout, the apical joint slightly longer than the basal and rounded at apex.

Thorax depressed, its depth hardly greater than one half the width, and about one half longer again than wide; pronotum deeply arcuate and narrow; mesoscutum very flat, about one half wider again than long, its posterior margin slightly angulate at the middle; axillae short, considerably over twice as wide as long, and meeting at their tips; scutellum a little wider than long, about rectangular at apex, the disk nearly flat, not greatly elevated and abruptly sloping downward along the lateral margins; propodeum very short medially but triangularly enlarging towards the sides, the metapleura small and narrow but reaching to the hind coxae. Dorsum of abdomen moderately sunken in, the venter depressed with the fifth ventrite reaching about to the middle and leaving the ovipositor free; protruded part of the ovipositor sheaths terete; vibrissal plates situated on the lateral margins of the dorsum half way between the base and the middle, the vibrissae falling considerably short of the apex.

Legs normal, the tarsi slender and not thickened at base, the first joint of the middle pair as long as the four following joints combined and a little longer than the slender tibial spur. Wings narrow, reaching considerably beyond the apex of the abdomen; venation reaching to the middle of the disk; submarginal vein somewhat enlarged and slightly broken at a point one third of its length from the distal end, marginal vein stout and about four times longer than thick, stigmal vein about one half as long, narrow at base and triangularly enlarged at apex, the postmarginal short and spurlike; speculum narrow and of equal width throughout, falling somewhat short of the stigmal vein but extending to the bare area along the posterior margin of the wing, and interrupted near its lower end by two stout bristles; marginal cilia rather long, the discal cilia extremely various and helping to form the fuscous rays and band, those on the base of the disk before the specu-

lum in the form of stout, tapering moderately long bristles with the one contiguous to the thickened part of the submarginal vein about twice as long as all the rest; those on the darkest fuscous areas beyond the speculum similar along the anterior margin of the disk but becoming somewhat finer on the median band and along the posterior margin, and interspersed throughout in the fuscous areas with much shorter, blunt and flattened bristles; cilia of the clear areas in part extremely fine and transparent and partly black and somewhat coarser, these dark cilia being distributed over the whole of the subapical clear spot on the posterior margin, or the inner half of the corresponding spot on the anterior margin, and along the inner margins of the median pair of clear spots, covering the inner third of the anterior one of this pair; bristles on the submarginal vein pale colored, very slender and rather long; those on the marginal vein much shorter and stouter, being flattened and spear-shaped.

Face and cheeks with a fine delicate reticulation more evident on the sloping dorsal sides of the scrobal impression; mesoscutum much more distinctly and somewhat more coarsely reticulate; mesopleura extremely finely reticulate and nearly opaque; axillae finely, closely and transversely lineolate; frontovertex with crowded thimble-like punctures, considerably coarser than those on the scutellum of *Plagiomerus* yet very fine although not producing an opaque effect, and becoming obsolete anteriorly on the reflexed part of the frons; the latter with two distinct pin-punctures arranged in a transverse line at the angulation and another pair just posteriorly on the dorsal part of the frons but considerably obscured by being located at the edge of the thimble-punctured area; scutellum with similar and a little coarser thimble-punctures on the disk but becoming smooth and polished on the sloping sides and more narrowly at apex; metanotum and propodeum rather dull but without evident sculpture; abdomen mostly smooth and polished but becoming finely reticulate on the last tergite except at the sides.

Pubescence throughout very sparse and inconspicuous; the eyes bare, the other parts of the head nearly bare except for the narrow, semicircular orbital line of silvery white, recumbent hairs bounding the dorsal limits of the face; mesoscutum with sparse, fine, bristle-like and blackish hairs seriately arranged; scutellum with about six bristle-like hairs towards the base, somewhat longer than those on the mesoscutum, and with apparently no bristles at all at apex; apex of abdomen and protruded part of ovipositor with short, delicate, pale-colored pubescence.

Length: 1.07; length of head: 0.307; width of head: 0.356; width of vertex at the posterior ocelli; 0.106; width of mesoscutum: 0.362; length of fore-wing: 0.912; width of fore-wing: 0.372; length of protruded part of ovipositor: 0.134 mm.

Head and notum of thorax metallic green, the sloping sides of the scrobal impression with a purplish luster, the reflexed part of the frons bluish green; mesoscutum with more brilliant brassy and golden reflections, the underparts of the thorax black and but slightly shiny;

abdomen metallic blue with a moderately strong luster, the sunken in area of dorsum more blackish, the ovipositor sheaths black, the spicula yellow. Antennae black, the funicle and the club somewhat more brownish, the sixth funicle joint yellow, the club slightly yellowish towards the apex. Front legs brown, with the base of the femora and the tarsi yellowish, the apical half of the tibiae yellow; middle and hind legs black, with the apical half of the middle tibia, apex of hind tibiae and both pair of tarsi, except apex of the last joint, yellow.

Fore-wings marked with fuscous rays from a longitudinal band arising from the integumentary pigment and from the dark ciliation as follows: A large quadrate fuscous area beneath the venation from the break in the submarginal to the apex of the stigmal vein enclosing a small hyaline spot between the speculum and the apical part of the submarginal vein; the first two rays on the anterior margin produced by this hyaline spot and located respectively at the break in the submarginal, and beneath the marginal and stigmal veins; the quadrate area further enclosing a central hyaline spot beneath and beyond the speculum, but the posterior margin of the disk remaining dark so that the rays on the margin at this point are not differentiated; the fuscous area continued beyond the venation as a broad median longitudinal band constricted before the apex and then triangularly enlarged at apex; the band sending out two rays above, the third and fourth on the anterior margin, one just before the constriction, the other at the apex and continuous with the triangular enlargement; the band further emitting one ray, which is narrowed at its base, just before the constriction towards the posterior margin, but the apical ray on this margin is not differentiated from the triangular enlargement of the band; the four rays on the anterior margin much darker than the rest of the fuscous area or nearly black, the first one narrowest, the others increasing gradually in width from the second to the fourth; the first pair of hyaline spots beyond the venation quadrate, the one on the anterior margin nearly square, the other a little longer than wide; the second or subapical pair of hyaline spots both wider than long; most of the submarginal vein brownish yellow, its apical part and the stigmal vein nearly hyaline, the marginal vein brown. Hind-wings entirely hyaline.

Described from 1 female (type) collected on the Manoa Cliffs Trail, Tantalus, Oahu, Oct. 26, 1919 (W. M. Giffard). This certainly must be an immigrant species but it is not yet apparent from what part of the world it was derived, although an Oriental origin is suspected.

Fig Wasps.—Mr. Ehrhorn exhibited a Philippine fig containing galls from which fig wasps had been dissected. The latter were also exhibited.

Anomala flavilabris.—Mr. Ehrhorn exhibited a specimen of this beetle killed by fungus. It had been sent from Japan by Mr. Langford, who wrote that thousands of the beetles were found dead on the ground in a locality near Tokyo. Mr. Ehrhorn stated that the pathologists of the Experiment Station, H. S. P. A., were attempting to cultivate the fungus, and that they thought it to be the same as the fungus introduced by Mr. Muir from the Philippines a few years ago.

Callithmysus koebelei.—Mr. Bridwell exhibited a specimen of this beautiful beetle, bred from mamake (*Pipturus albidus*), and stated that he found the larvae in considerable numbers about two months ago on the Manoa Cliffs trail. He also reported finding larvae of another species in *Byronia* at the same place; and additional larvae of the species in *Pittosporum* on the windward side of Mt. Konahuanui.

Dolichurus stantoni.—Mr. Bridwell remarked on the great decrease in roaches of the genus *Phyllodromia*, brought about by the recently introduced *Dolichurus* from the Philippines, and paralleling the case of *Anomala orientalis* being quickly reduced to harmless numbers by the introduction of *Scolia manilae* from the Philippines.

Aphis middletoni.—Mr. Timberlake identified an Aphid which Mr. Swezey had found on the roots of *Coreopsis* in Kaimuki, as this species and stated that he had found it also on China aster. Mr. Ehrhorn added that this species was found commonly by Mr. Marsh on asters as early as 1910, and that it caused considerable damage to the plants.

DEFERRED BUSINESS.

The Committee on Entomological Organization submitted a report, containing recommendations to the Bishop Museum and the Committee of the National Council of Research, on entomological work in the Pacific. The report was accepted and the Secretary ordered to communicate a copy to Dr. H. E. Gregory, Director of the Bishop Museum, and to print the same in the Proceedings. The Committee was then discharged and its work transferred to the Executive Committee with the addition of J. C. Bridwell.

The President announced the appointment of Messrs. Timberlake, Pemberton and Bridwell as a Committee on Common Names of Economic Insects, Mr. Timberlake to act as chairman.

Report of the Committee on Entomological Organization.

(Submitted Dec. 9, 1919)

Biological Problems of the Hawaiian Insect Fauna.

In the recommendations made by this Committee for lines of entomological work appropriate to be carried on by the Bishop Museum, and presented to the Society for consideration at a special meeting June 17, 1919, and later transmitted to the Director of the Museum, one topic was designated, "Biological Problems," in connection with the endemic insect fauna, without giving detailed statement of such problems. The Committee now presents a detailed outline of certain lines of work open for research investigations with the endemic Hawaiian insect fauna.

1. *Life Histories in General.*

Much remains to be done in working out life histories and other habits in all the Orders of insects; and the discovery of their food plants and host relations, or other food habits.

Special Subjects.

Lepidoptera.

Leafminers of *Pelea* (*Opostega* sp.).
Other leafminers.
Banana moths.
Leafroller caterpillars.
Wood feeding caterpillars.
Fruit and seed caterpillars.
Discovery of food plants of caterpillars in genera in which they are at present unknown, e. g.: *Mestolobes*, *Orthomecyma*, etc.
Habits of the case moths of the large genus *Hyposmocoma* (170 species).

Hymenoptera.

Nesting habits of wasps.
Food of predatory and parasitic wasps.
The genus *Sierola* and host relations.
The genus *Sclerodermus* and host relations.
The genus *Eupelmus* and host relations.
Parasites of *Lepidoptera*.
Parasites of scale insects.
Parasites of mealy bugs and *Aphis*.
Parasites of *Delphacidae*.
Parasites of *Coleoptera*.

Coleoptera.

The *Carabidae*.
The longhorn beetles (*Plagithmysides*).
The genus *Heteramphus*.
The genus *Rhynocogonus*.
The genus *Proterhinus*.
Beetles in relation to the declining forests.
Beetles feeding in dead wood.
Predacious beetles.
Flightless beetles.
Hosts of *Laboulbeniaceae*.
Scavenger beetles.
Parasitism of *Coleoptera*.

Diptera.

Aquatic *Diptera*.
Leafminers.
Parasitic *Diptera*
The crane flies.
The genus *Dyscritomyia*.
The genus *Drosophila* (many native species).

Homoptera.

The Jumping Plant-lice (*Psyllidae*).
Leafhoppers (*Delphacidae*).
The genus *Oliarus*.
Tree hoppers (*Jassidae*).
Endemic mealy-bugs.
Parasitism of *Homoptera*.

Heteroptera.

Predacious bugs
The genus *Oechalia*.
The genus *Reduviolus*.
The genus *Nysius*.
The *Capsidae*.

Orthoptera.

Predacious forms.
Parasitism of *Orthoptera*.

Odonata, Neuroptera, etc.

Habits of the *Hemerobiids*.
Parasitism of the *Hemerobiids*.
Discovery of larval habits of native ant-lion.
Dragon-flies.
Psocidae.

Studies in Variation, including breeding experiments, can be carried on with several of the groups. This line of research is specially attractive here, for six or more generations may be had per year.

Of these special subjects, those with reference to *Hymenoptera* have several of the members of the Society specially interested in them: the *Aculeates*—Messrs. Giffard, Williams, Timberlake and Bridwell; the *Parasitica*—Messrs. Fullaway, Timberlake, Bridwell and Swezey.

In the *Lepidoptera*, Mr. Swezey has been carrying on researches in most of the lines mentioned.

In *Coleoptera*, Messrs. Giffard, Bridwell and Swezey are especially interested in certain problems, and Dr. Perkins is still doing systematic work with the beetles.

The *Diptera* are receiving less attention than some of the Orders. They have been considerably neglected in the past.

The *Homoptera* have several working on them: Messrs. Giffard, Muir, Timberlake, Swezey, Bridwell and Crawford.

The *Heteroptera* are not being actively dealt with just at present, nor are the other Orders: *Orthoptera*, *Odonata*, *Neuroptera*, etc., though much material is at hand for working, especially in the *Heteroptera*.

In fact the entomologists of Honolulu, members of the Hawaiian Entomological Society, or those engaged officially in entomological work of one kind or another chiefly with reference to economic or practical work with insect pests at one or another of the different institutions, are interested in many of the lines of research above indicated, and have spent much time on some of them, and are continuing to do so as time and opportunity presents. But in this way progress must needs be slow as compared with a research worker putting his whole time and attention on a special subject, without other duties to continually interrupt or interfere with his progress.

2. *Collecting.*

For most of the lines above mentioned, much collecting is necesssary, not only in general throughout the Islands, but in special places where no collecting has been done, particularly in localities where the native forests are rapidly on the decline and are disappearing, and this can best be done by persons trained in the special methods of insect collecting in these Islands, to obtain results, and capable of taking the desired notes and data as to host, location, other conditions, etc.

3. *Systematic Entomology.*

This line of work must go hand in hand with biological researches. It involves: descriptions of new species; revisions of groups; production of synoptic tables, etc. Many of the members of the Entomological Society are having a share in this already.

4. *Bearing on Factors of Evolution.*

Many of the biological problems are of great importance on

account of the bearing they have on the factors of evolution, and should be carried on with these points in mind.

The present economic entomologists should by all means be encouraged to continue with the lines of research they are interested in and now following; but an efficient entomological staff at the Museum would be in position to carry on many lines of research to advantage which cannot be satisfactorily handled by the other entomologists.

Reference Collection of Hawaiian Insects.

It is only natural that a subject of such consuming interest to the active workers in entomology here, as the entomological policy of the Bishop Museum, should receive further thought and deliberation, and we find ourselves at present, after the lapse of six months, burdened with many suggestions of a specific nature on the means of accomplishing the work outlined. Regarding a "Reference Collection of Hawaiian Insects," we desire to state our absolute conviction that nothing of importance can be accomplished in the way of building up such a collection of Hawaiian insects until a competent, trustworthy and permanent curator of insects is appointed. Only a competent man can do the work well, and the labor involved would require his entire time for many years. It has been stated before that there are "types" and series of specimens of endemic as well as introduced insects ready for the Museum when a competent and trustworthy custodian is provided and liberal regulation of their use admitted.

It has also been pointed out that the Museum now has representatives of sixty-four per cent of the species of Hawaiian insects known and listed at the time the Fauna Hawaiiensis was published. These are virtually "types," being actual specimens in hand when the descriptions were made. With so large a proportion already possessed a complete representation seems eminently desirable, and its importance to workers here, who are desirous of carrying on the labors of Blackburn, Perkins, Kirkaldy and others, cannot be over-stated. It is impossible for most of us to go as far as London to examine the "types"

unrepresented here, yet thorough descriptive work cannot be done without seeing them. Apparently undescribed species are constantly being discovered as the result of intensive collecting, which should be published. Also many groups of Hawaiian insects need revison badly and the material is at hand for the work. The Museum could foster work of this kind by offering to finance the study of the "types" by specialists undertaking descriptive or revisory work, receiving in return for the outlay, the manuscripts for publication and insect material, including "types," specimens compared with "types," and series of specimens for reference to build up the collections. Some of this work could undoubtedly be undertaken by the curator.

When the further entomological exploration of the Pacific, now in contemplation, begins to secure results, if, as this Society has strongly urged, the material obtained is turned over to the Museum, the need for this advanced organization of its entomological work will become more imperative and indeed, this work should not otherwise be undertaken.

The Entomological Exploration of the Pacific.

In view of the plans now under consideration for the further scientific exploration of the South Pacific by means of an exploring voyage in the near future, the Hawaiian Entomological Society has felt it could be of assistance by a formulation of its experience and its conception of the methods by which the work in its own field may best be carried out. In the fifteen years of its existence there has been developed among its membership a lively interest in the wider entomological problems of the Pacific and the discussions of these matters have resulted in the crystallization of definite ideas among its members, probably based upon a broader experience of Pacific, and particularly Polynesian, entomology than can be found in any other body of scientific men.

The broad purpose of the scientific exploration now in contemplation is doubtless to secure material upon which to

base a well grounded opinion in regard to the supposed former existence of a Pacific continent and thus to secure further evidence upon the question of the permanence of the continents and oceans, and, if there may be considered to have been such a Pacific continent, to find its former extent and its relations to the surrounding continental areas, its antiquity, the origin of its fauna and flora, and the extent of divergence in the various groups, and to trace as far as it may be done, the history of the human race in the Pacific. To the broad purpose of the exploration and to the subordinate ends, we feel that an adequate entomological exploration will contribute largely. The richness and diversity of any insect fauna in comparison with that of other phases of land animals and its greater persistence under conditions leading to the extinction of the larger forms of animal life, tends to make the conclusions drawn from it less subject to accidental errors. We believe that the biological evidence in regard to these problems must rest primarily upon a thorough knowledge of the phanerogamic flora, the land shells and the insects of the regions to be explored.

How this knowledge of the insect fauna may best be secured is indicated by the work done in the past. Few, if any, of the great explorations in the Pacific have made any considerable contribution to our knowledge of the insect fauna, and today the only group of islands in the Pacific where this fauna is at all adequately known is our own group where the Committee of the Royal Society and the British Association hit upon the method by which an insect fauna may be made known. It was by the selection of such an extremely capable entomological naturalist as Dr. Perkins and by keeping him long enough upon the ground to do the work that the truly remarkable results embodied in the Fauna Hawaiiensis were secured.

In the opinion of this Society, the adequate entomological exploration of the Pacific from the standpoint of the problems stated and the particular phase of the relation of the Hawaiian

insect fauna to that of the South Pacific, requires the exploration of certain islands or groups of islands. Those which seem to us most important are these: The Galopagos, San Juan Fernandez, Easter Island, some of the low eastern coral islands such as the Paumotus, the Marquesas, Tahiti, Samoa, the Fijis, and some of the low western coral islands, probably the Marshall Islands. Aside from these the Bonin Islands are known to have some curious biological relations which make their exploration desirable and the insect fauna of New Zealand, other than the beetle fauna is in great need of further exploration. The island groups between Fiji and New Guinea, while of very great interest, are so obviously related entomologically to New Guinea that their exploration would fall into relation with the exploration of that region rather than with the region which we have under consideration.

The Galopagos Islands are generally supposed to have been more or less thoroughly explored entomologically but in discussing the matter with Dr. F. X. Williams, who did the entomological work for the California Academy of Sciences Expedition, we learn that he considers that less than fifty per cent of the Galopagos insect fauna is known and that more intense collecting, particularly in the upland forest, which has proved to have so many peculiar and interesting forms in the Hawaiian Islands, is much to be desired.

While an exploring voyage such as is being planned at present, may, under proper arrangements, secure results of inestimable value in planning the future work of exploration, it will be a most deplorable mistake to suppose that it will be possible, under the conditions of such a voyage at its very best, to make an adequate entomological exploration of any but the smallest of the islands and then only if there are other matters of importance which are likely to lead to a considerable time being spent there. The only way in which the explorations may secure materials upon which any well based opinions can be founded, is to place a well trained man on the ground for a period of not less than one year and in all probability for a

longer period. If his work can be done simultaneously with botanical explorations, much will be gained, for the most effective entomological work in these regions calls for an intimate knowledge of the flora which can hardly be expected from an entomologist working alone.

Judging from our experience here, even the best collector of insects from the temperate regions needs a complete reeducation in methods of work before he can work in such regions as those to be explored, for it may be expected that the insects there, as they are in Hawaii, will be found closely attached to the endemic or native plants and one unfamiliar with the hundreds of tropicopolitan plants will waste much of his time on these plants, when one familiar with conditions would be doing significant work. It seems to be of the greatest importance that there should be secured, if possible, for the work with the proposed expedition and in the necessary subsequent work, someone who has had experience in collecting in the Hawaiian Islands and is already somewhat familiar with the special methods of collecting which have been developed here, and with the special problems of the Pacific.

We have already expressed ourselves as of the opinion that such future explorations of the entomology of the Pacific should be centered in the Bishop Museum of Honolulu and we believe the material secured should be placed there and studied under the administration of the curator of insects when that position is filled. With the proper organization of this work, in that institution, it is probable that these explorations will arouse a continuing interest in this work among residents of the various island groups and will result in further material being made available for study when they know where such material can be sent.

C. L. Crawford,
W. M. Giffard,
O. H. Swezey,
J. C. Bridwell,
D. T. Fullaway,
Committee.

Immigrant Records for 1919.

BY THE EDITOR.

During the year 1919, 25 immigrant insects were recorded for the first time. Some of them have evidently been present for several years without having been noticed. None of them are of much economic importance, not being considered as pests at present. Several of them are parasites or predators, hence to be considered beneficial. Of some of them the habits are not yet known. A list is here given with the pages on which the records occur.

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PARADISE OF THE PACIFIC, HONOLULU

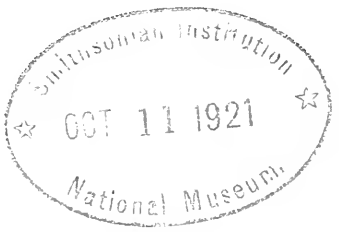
VOL. IV, NO. 3. SEPTEMBER, 1921.

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1920



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PROCEEDINGS

OF THE

Hawaiian Entomological Society

Vol. IV, No. 3. For the Year 1920. September, 1921.

JANUARY 8th, 1920.

The 172nd meeting of the Hawaiian Entomological Society was held in the entomological laboratory of the H. S. P. A. Experiment Station, President Crawford presiding. Other members present were Messrs. Rosa, E. H. Bryan, Williams, Giffard, Timberlake, Bridwell, Ehrhorn, Osborn, Swezey, Willard, and Fullaway.

The minutes of the previous meeting were read and approved with corrections.

Mr. F. W. Macfarlane was unanimously elected to membership.

The committee on common names reported that it had not yet completed its work. Mr. Ehrhorn was appointed by the Chair as alternate on the committee.

A letter from Mr. C. S. Judd, Territorial Superintendent of Forestry, was read, asking the opinion of the Society as to the desirability of using in reforestation work, trees whose fruits are known to be attacked by the Mediterranean fruitfly. The following committee was appointed by the Chair to consider the matter: Messrs. Willard (chairman), Giffard and Fullaway.

The report of the Auditor was read and, on motion, duly seconded, was accepted and the Auditor discharged.

Note on the Eggs of Araeocerus Fasciculatus De G. (Anthribidae, Coleoptera).

BY O. H. SWEZEY.

In examining some koa pods collected on Sugar Loaf Hill, June 23, 1919, I found several clusters of white, hatched eggs inside the pods where the larvæ of *Cryptophlebia illepida* (Butler) had eaten out the seeds and had made exit holes thru the side of the pod. At the time I could not make a satisfactory determination of these eggs.

On November 9 of the same year, I collected some more koa pods in the south end of the Waianae Mountains. On examining these, many more of the same eggs were found, mostly hatched, but a few that were unhatched, and these hatched a few days later. In the same batch of koa pods were also many egg clusters of *Pantomorus fulleri* (Horn), some hatched and others unhatched. As the unknown eggs were somewhat similar and placed in similar places, and as the young larvæ also resembled those of *P. fulleri* (except that they had legs), and as there is no other related beetle known here of which these could have been the eggs, I feel certain that they belong to *Araeocerus fasciculatus*.

I have looked up many references to this beetle in American entomological literature, and also from other parts of the world, but I could find no mention or description of the eggs, from which one could infer that the eggs were not known. Hence, I herewith give a description of the eggs.

Before hatching the eggs were yellowish; the empty eggshells are pure white. The surface is completely covered with longitudinal rows of pits like the surface of a thimble; short cylindrical, with rounded ends about 0.8 mm. long and about 0.4 mm. in width. They were deposited in rather loose masses of 40 to 60 eggs, yet adhering together, tho not firmly cemented together as is the case with those of *P. fulleri*. They had

apparently been deposited by the female thrusting her ovipositor thru the hole in the pod made by the moth larva which ate the seed, and were in the space formerly occupied by the seed. In one pod five successive seed cavities were occupied by masses of the eggs of *A. fasciculatus*.

NOTES AND EXHIBITIONS.

Strumigenys lewisi.—Mr. Williams exhibited specimens of this ant taken January 4, 1920, under stones at the head of Manoa Valley, at 900 feet elevation, and made the following note: The first record of this species in Hawaii was made in the spring of 1911 by Ehrhorn, who took the species in quarantine, from material originating in Japan. In April, 1917, Bridwell took the species in rotten wood in Palolo Valley. The present record is apparently the third.

Celerio calida.—Mr. Williams reported finding, on the same day, numerous larvae of this native Sphingid on *Scaevola chamissoniana* at the head of Manoa Valley. He remarked that Dr. Perkins stated the larvae to be polyphagous. They have previously been found upon *Straussia*, *Coprosma*, etc.

Vanessa tammeamea.—Mr. Williams reported observing this butterfly clustering in numbers on the under side of the limb of a koa tree. There were seven in the largest cluster. It resembled the hibernation habit of similar butterflies in the Temperate zone, and may be the relic of an instinct.

Melanocrabro curtipes.—Mr. Williams exhibited a male example of this wasp, collected November 1, at Kilauea, Hawaii. The deeply excavated abdomen and rough sculpture are peculiarities of this wasp.

Plagithmysine larvae in Pittosporum.—Mr. Bridwell reported rearing successfully four adult beetles from larvae found in *Pittosporum* on the windward side of Konahuanui. He stated that the form is transitional between *Neoclytarlus* and *Plagithmysus*, having the form of body and markings like the former, and form of tarsi and pubescence of hind legs like the latter. He thought, however, that it should be considered a *Neoclytarlus*.

Lepisma sp.—Mr. Bridwell reported capturing in the labora-

tory of the Experiment Station, H. S. P. A., specimens of *Lepisma*-like Thysanuran not previously recorded here. It differs from *Lepisma*, however, and probably belongs to a different genus. It is more or less spotted, the scales on the body, however, are similar to *Lepisma*.

Semnoprepia larvae in ohia.—Mr. Bridwell reported observing caterpillars (probably *Semnoprepia* larvae) attacking the living bark of ohia trees on Mt. Kaala. This is his third record of larvae attacking living wood tissue, which were supposed to attack only dead wood.

Neoclytarlus indecens.—Mr. Bridwell reported finding the larvae of this beetle in *Smilax* stems, December 26, on Mt. Kaala. He found that the eggs were laid at the nodes of green stems, and the work of the larvae at the nodes kills the stem. Later, the entire stem is eaten out by the larvae. This is another instance of a native insect attacking living plant tissue. In the same material was also found the first winged female of an endemic species of *Sclerodermus*. This was *S. polynesialis*, and it was attacking the larvae of *N. indecens*. The same species was also reported attacking the larvae of *Oodemas* in Manoa Valley.

Sierola sp.—Mr. Bridwell reported having reared from *Smilax* stems two species of *Sierola* attacking lepidopterous larvae, probably of the genus *Semnoprepia*.

Periplaneta americana.—Mr. Bridwell reported observing the mating dance of this cockroach, while walking in Palolo Valley in the moonlight, January 4. Fifty to seventy-five individuals were so engaged in the middle of the road. This same roach, Mr. Ehrhorn reported having observed feeding on canna blossoms in Manoa Valley.

Ornithoica sp.—Mr. Bryan exhibited specimens of a Hippoboscid fly reared from pupae found on the neck feathers of a pheasant shot on Kauai by Mr. Broadbent, who stated that the same insect is also found on mynah birds. The fly appears to belong to the genus *Ornithoica*.

FEBRUARY 5th, 1920.

The 173rd meeting of the Hawaiian Entomological Society was held in the usual place, Mr. Crawford presiding, other members present being Messrs. Bryan, Giffard, Osborn, Rosa, Swezey, Timberlake, and Williams.

In the absence of the Secretary, the reading of the minutes of the previous meeting was omitted, and Mr. Timberlake was appointed Secretary pro tem. by the Chair.

NOTES AND EXHIBITIONS.

Vespa occidentalis.—Mr. Williams reported the capture of a fresh specimen of a queen of *Vespa*, to all appearances *V. occidentalis* Cresson, taken by Messrs. Rock and Agee at 4000 feet, Halemanu, Kauai, on January 30th. The insect, which was benumbed with cold, was found clinging to the under side of a fallen post, where it was presumably hibernating. This is the first record of a species of *Vespa* for the Hawaiian Islands, and it seems probable that this species is already established on Kauai. Its natural habitat is the western part of the United States.

Mr. Swezey stated that he had taken this species in Arizona, California, and Oregon, and exhibited his collection of North American species of *Vespa*.

Immigrant Insects Recorded in 1919.*—Mr. Swezey submitted a list of 25 immigrant insects, recorded by the members of the Society for the first time during the year 1919. Mr. Swezey remarked on the economic importance of the included species, and stated that none so far as yet known will become pests of any great importance, and that some are distinctly beneficial. *Calandra taitensis* and *Aphis middletonii* have some economic interest, while *Chrysopa*, *Silaon*, and some of the parasitic Hymenoptera are beneficial.

Scolia manilae.—Messrs. Swezey and Osborn spoke of the habits of *Scolia* and its preference for cultivated ground. This is detrimental on the whole for the control of *Adoretus* in some

* Printed in Proceedings for 1919, page 448 (Ed.).

localities where it is found more or less abundantly in sod land.

New Syrphid.—Mr. Timberlake exhibited larvae and puparia of an aphidivorous Syrphid new to the islands, collected on corn infested with *Aphis maidis* at the College of Hawaii, Manoa Valley. A single larva was also found a month earlier at the Federal Experiment Station on corn, but it died of disease.

Scarabaeids from Queensland.—Mr. Swezey exhibited a set of 18 injurious Scarabaeids and 7 species of their parasites collected by Mr. Illingworth in Queensland.

MARCH 4th, 1920.

The 174th meeting of the Hawaiian Entomological Society was held at the usual place. Mr. Williams presided, and other members present were Messrs. Bridwell, Bryan, Ehrhorn, Giffard, Rosa, Swezey, Timberlake, and Willard. Mr. Timberlake was appointed Secretary pro tem., and the minutes of the two previous meetings were read and approved.

ENTOMOLOGICAL PROGRAM.

On behalf of Mr. Fullaway, the acting Secretary presented a note on "*Cryptotermes brevis* in Hawaii."

Cryptotermes brevis in Hawaii (Isoptera).

BY D. T. FULLAWAY.

Examples of this immigrant species of *Cryptotermes* found commonly in Honolulu were recently referred by me to Mr. Thomas E. Snyder of the U. S. Bureau of Entomology for determination. Mr. Snyder identifies the species with *Cryptotermes brevis* (Walker) and gives the habitat as South and Central America, the West Indies, and in the United States only at Key West, Florida. In Cuba and at Key West, Florida,

according to Mr. Snyder, this insect is very destructive to the woodwork of buildings and furniture. It is able to work in *dry* wood. This species, through specimens preserved in the collections of the H. S. P. A. Experiment Station, is known to have been in Hawaii previous to 1904, but its generic position was not determined until the discovery of the soldier a few years ago.

A New Immigrant Weevil Attacking Banana (Coleoptera, Curculionidae).

BY O. H. SWEZEY.

On February 19, I found this weevil in the decaying portion of a banana stump at my garden in Kaimuki. It is so small that it was only by chance that it was first discovered. The white larvae were first seen, then with careful search, pupae and adult beetles were found. Continuing the search in the decaying substance, a large number of the beetles were found. They were in the very rotten part of the underside of the corm, the larvae were found feeding in the part that was more solid.

This species is smaller than any of the known native species of *Dryophthorus*, and has a longer and more slender rostrum in proportion to its size. However, it runs to the genus *Dryophthorus* in Blatchley & Leng's Rhynchophora or Weevils of N. E. America, it having five-jointed tarsi, on account of which structure this genus is stated to differ in this respect from all American Rhynchophora except a few species of Scolytidae.

The Hawaiian species of the genus are deadwood feeders, and perhaps all species of the genus have similar habits. It may be that this new form belongs to some other near related genus. Specimens will be sent to Dr. Guy A. K. Marshall for determination.*

* Dr. Marshall's determination received before going to press. He has described it as a new species *Stenommatus musae*, the genus being very closely related to *Dryophthorus*. Publication of the species is in Bulletin of Entomological Research, XI: 277, Pl. VII, fig. 7, 1920. (Ed.)

Jassid on Eragrostis sp.—Mr. Giffard exhibited specimens of an undetermined Jassid collected on an *Eragrostis* near the Halfway House, Kau, Hawaii, at 2500 feet elevation, on August 27, 1919. It is apparently the same species found by Mr. Giffard on *Eragrostis* at Diamond Head, Oahu, several years ago. Specimens have been sent to Professor Osborn for determination. Mr. Timberlake remarked that the flightless Jassid he had taken on Haleakala, Maui, at 8000 feet elevation, shows some points of resemblance to this species. Mr. Giffard spoke further on the progress of Professor Osborn in his work on Hawaiian Jassidae, and of Mr. Van Duzee in his work on the Heteroptera.

Coccus acutissimus Green.—Mr. Ehrhorn reported finding this Coccid at Honolulu on litchi, and stated that it was a new record for the islands, but that it had probably been here a long time. It was recorded by Green on banana.

Plutella on Lepidium.—Mr. Bridwell spoke of finding a *Plutella* on the native *Lepidium* at Makapu Point. The cocoon is similar to that of *Plutella maculipennis* and specimens when reared may prove to be the same.

Plagithmysine on Elaeocarpus.—Mr. Bridwell reported a plagithmysine larva which he had found in the dead bark of *Elaeocarpus*, well up in Makaha Valley, Waianae, Oahu.

Bruchus limbatus.—Mr. Bridwell recorded this Bruchid breeding in the seeds of opiuma, and stated that he had found it spread as far as Castner in the middle of the island, but not yet on the far side of Oahu.

Tephritis.—Mr. Bryan stated that he was working on this genus and wished to examine more material.

Trypoxylon sp.—Mr. Williams reported that he had found specimens of our small, unnamed immigrant *Trypoxylon* in the Experiment Station collection, from Los Banos, Philippines (*Williams*) and Hongkong, China (*Terry*), the species being represented by one specimen from each locality.

APRIL 1st, 1920.

The 175th meeting of the Hawaiian Entomological Society was held at the usual place with Mr. Crawford in the Chair. Other members present were Messrs. Bridwell, Bryan, Ehrhorn, Giffard, Osborn, Rosa, Swezey, Timberlake and Williams, and Messrs. J. Aug. Kusche and C. P. Clausen, visitors.

In the absence of the Secretary, Mr. Timberlake was appointed by the Chair as Secretary pro tem., and the minutes of the last meeting were then read and approved.

Mr. Crawford reported that the Executive Committee had voted to sell the Society's set of the Review of Applied Entomology to Mr. Ehrhorn's office at $3.00 per volume, and the set of Pomona Journal of Entomology to the Planters' Experiment Station for $5.00; he also reported that the Executive Committee had appointed Mr. Swezey, editor, Mr. Pemberton librarian, and Mr. Timberlake custodian of the type collection.

Mr. Crawford then spoke of the preparations that had been made for the Pan-Pacific Scientific Congress to be held in Honolulu in August, and that the Executive Committee had recommended to Dr. Gregory that Dr. L. O. Howard of Washington, D. C., Prof. C. F. Baker of Los Banos, Philippine Islands, and Dr. R. J. Tillyard of New South Wales, Australia, should be brought to Honolulu to attend the Congress, with Dr. Vernon Kellogg of Stanford University as alternate, if Dr. Howard could not be induced to come. A list of other prominent entomologists was also submitted to Dr. Gregory, with a recommendation that a warm invitation to attend the Congress be extended to them. Mr. Crawford also reported that the Hawaiian Sugar Planters' Association had been asked to contribute to the funds of the Congress an amount to be used only for defraying the expenses of the entomologists named above.

The Society by unanimous vote approved of the action of the Executive Committee in regard to this Congress.

Notes From Easter Island.*

BY WM. A. BRYAN.

(Communicated by O. H. Swezey.)

The native inhabitants of the lonely island, Rapanui, or Easter Island, belong unmistakably to the great Polynesian family. Today there is only a small colony of 270 remaining out of a population that at one time must have numbered several thousand. They were avowed cannibals at the time of the discovery of the island, but with this combined a knowledge of cutting stone and building huge cut stone *ahus* or temples that is truly marvelous. They were, so far as is known, the only Polynesian tribe that had any form of writing—which consisted in engraving curious unmatched characters on planks of wood. Taken altogether, their origin and culture forms one of the greatest, if not *the* greatest, of the many great puzzles in Polynesian anthropology and ethnology.

The people at all times have stoutly maintained that their ancestors came in boats from over the sea, but from which islands, or what direction, they have no knowledge whatever. With them they brought a few of the plants of the land of their origin, including two varieties of bananas, the yam, the "ki"; "hauhau," from which they made fish line; perhaps the "tolomilo," of which wooden idols were made, and of special interest in this connection a species of mulberry or "mahute," determined by Professor Francisco Fuentes, botanist of the University of Chili, as *Broussonetia papyrifera* Vent.

From the bark of the "mahute" the natives made a rough grade of tapa cloth. This shrub or small tree, now bordering on extermination on this island, was planted by the natives in the most favorable localities for moisture and soil and tended with great care. A few clumps are still living in the great

* These notes, dated February 7, 1920, were received from Mr. Bryan with the request that they be published in connection with description of the beetles, six specimens of which were sent. (Ed.)

crater of Rana Roa and in scattered lava caves at various places about the island.

The dead and dying twigs of all the trees examined were found more or less infested with a species of bark beetle which seemed to be entirely attached to this one species of growth. None of the other vegetation, native or introduced, was in the least attacked by it. Moreover, the only species of land shell* found on the island, was also found in the channels formed by this beetle in the dead twigs at the ends of living branches and in the decaying limbs under the trees, and nowhere else.

We thus have a beetle and a land shell apparently definitely attached to a plant of ancient native introduction. Doubtless the three were brought to Rapanui by the natives at the time of their first settlement on the island. The locating of a land where these three objects occur intimately associated will go far towards solving the location of the ancient home of the native inhabitants, and furnish indirect testimony of a convincing and novel character, tending to solve a question of very great interest and importance among students of the origin, life, migration and distribution of the primitive inhabitants of the great Pacific Ocean.

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* Living specimens of the land shells were sent to Dr. Pilsbry, Academy of Natural Science, Philadelphia, for critical study and determination of the species, and to Professor William Clapp of the Museum of Comparative Zoology, Cambridge, Massachusetts, for study of dentition, etc. Specimens of the plant, beetle and shell will subsequently be deposited in the Bishop Museum.

A New Bark Beetle From Easter Island (Coleoptera, Cossonini).

BY O. H. SWEZEY.

Sericotrogus bryani n. sp.

Color black, more or less shiny; antennae, legs, and anterior margin of pronotum red-brown.

Head globular, smooth and shiny and bearing minute sparse punctures, mostly enclosed in the prothorax. Eyes very convex, prominent, wide apart. Rostrum short, about two-thirds the length of prothorax, stout, slightly curved, sides nearly parallel, a little widened at apex, strongly punctate, the punctures in front of the antennae smaller, those behind antennae larger, the surface almost rugose. Antennae situated just behind the middle, scrobes deep, extending more shallowly to beneath eyes; scape reaching to posterior margin of eye, clavate, nearly straight; first joint of funicle about equal in length to second and third together and about twice as wide as second, third shorter than second, fourth and fifth subequal a little wider than third; club distinct, oval, clothed with white hairs, a few white hairs also on the funicle. Prothorax about one and one-fourth times as long as broad, slightly constricted a little behind the apical margin (the constriction more in evidence ventrally), behind the constriction widening evenly to beyond middle than narrowing roundly to the truncate base; dorsum slightly flattened; punctate with coarse deep punctures, smaller anteriorly, the apical margin impunctate, the sides longitudinally rugose; clothed dorsally with sparse golden decumbent hairs, arising from the punctures, absent in middle of disk (probably abraded) where interspaces are wider, smooth and shining. Elytra about twice as long as wide, wider at base than base of prothorax, truncate with slight humeral prominences, sides nearly parallel, slightly narrowing from base to two-thirds, then more rapidly to the rounded apices; striae moderately deep, interspaces wide, flat, more or less uneven, and their sides somewhat crenate; clothed with golden decumbent hairs in rows rising alternately from the striae and from small punctures in the interspaces. Under surface strongly and evenly punctate, smooth and shining between the punctures; metasternum with a median longitudinal line; ventral abdominal segments 1 and 2 joined, deep transverse grooves between segments 2-5. Legs moderate; all coxae wide apart, hind pair widest; femora clavate, unarmed; tibiae about two-thirds the length of femora, front tibiae shorter, all tibiae uncinate at apex; tarsi shorter than tibiae, third joint moderately bilobed. Length, including rostrum, 3 mm.; breadth, 1 mm.

Habitat.—Rapanui or Easter Island, January 20, 1920 (*W. A. Bryan*).

Proc. Haw. Ent. Soc., IV, No. 3, September, 1921.

Type in the collection of the Hawaiian Entomological Society; paratypes in the Bishop Museum, Honolulu. Described from six specimens (some of them broken) collected by Professor W. A. Bryan, under bark of *Broussonetia papyrifera*.

The genus *Scricotrogus* was erected by Wollaston in 1873 for the New Zealand species *subaenescens*. Several other species were described later on by Sharp and Broun, all from New Zealand. Some of these have been removed to other genera. The present species has resemblances to the other species of the genus, but differs from one and another of them in some details. It does not agree with the descriptions of the genera to which the species have been assigned that have been removed from *Scricotrogus*, and it may meet the fate of these, for it does not more nearly in all particulars exactly agree with Wollaston's description of *Scricotrogus* than some of them did.

NOTES AND EXHIBITIONS.

Mr. Giffard presented a letter from Prof. Osborn concerning the work on the Jassidae, in which the new Jassid from Kau, exhibited at the previous meeting, was mentioned as a representative of a new genus.

Mr. Clausen spoke of the status of *Popilia japonica*, or the green Japanese beetle, in New Jersey, of the attempt to control it, and of his forthcoming work in Japan in the search of parasites of this beetle.

Herse cingulata.—Mr. Ehrhorn exhibited a diminutive varietal specimen of the convolvulus sphinx, taken at Kahala on March 21, 1920.

Halimococcus sp.—Mr. Ehrhorn exhibited this Coccid, found very numerous in the crevasses of the bark of *Pritchardia kaalae*, at Makaleha, Mt. Kaala, in December, 1919.

Celerio perkinsi.—Mr. Bryan reported finding another specimen of this sphinx moth on March 7 on the ridge west of Nuuanu Valley, half way between Waiolani and Lanihuli peaks, it being the fourth specimen taken. The range of the species is now known to extend from Kalihi to Palolo, and a speci-

men apparently of this species was seen on the ridge west of Wailupe Valley on December 14, 1919.

Herse cingulata.—Mr. Bryan reported seeing this cosmopolitan sphinx moth pollinating the flowers of *Bauhinia spinosa* in the Normal School grounds. At about 6:20 one evening about 20 moths were seen hovering about the blossoms and on another evening about 30 moths were seen.

Kelisia emoloa.—Mr. Swezey exhibited three males and four females of this little Delphacid, collected by him on *Eragrostis*, at an elevation of 600 feet, on the ridge near the south shore of Kaneohe Bay, March 14, 1920. This is a new locality record for the species, it having been collected previously at Kuliouou and Palolo.

Chalcis obscurata.—Mr. Swezey reported rearing this parasite from the chrysalids of *Pontia rapae*. Seven chrysalids were collected on leaves of *Capparis sandwicensis*, March 3, 1920, on the coral plain near Ewa. Five of these produced *Chalcis obscurata* and the other two died.

Calandra remota.—Mr. Swezey exhibited specimens of this weevil found in a decaying banana root at Kaimuki on March 10. Nine weevils were found in the decaying under part of the corm of a feeble standing plant. This is the first time the weevil has been collected by him in the lowlands.

Trichogrammatid in *Elimaea* eggs.—Mr. Swezey reported having found, on February 20, fourteen eggs of *Elimaea appendiculata* in one leaf of an ornamental vine in his garden at Kaimuki, all placed in close series, this being the largest number he had ever found in one place. Four of these eggs were parasitized by a small black Trichogrammatid, five to eight issuing from each egg.

Neoclytarlus indecens.—Mr. Bridwell reported rearing adults of this beetle from *Smilax* twigs from Mt. Kaala, the bulk of the specimens dying within the dry twigs. Two specimens matured in joints of sugar cane to which they had been transferred. He further emphasized the importance of this method of rearing native plagithmysine larvae, first devised by Mr. Swezey.

Ischiogonus palliatus.—Mr. Bridwell reported this to be

a common parasite of plagithmysine larvae and specifically mentioned it as a parasite of *Neoclytarlus indecens* in material of *Smilax* twigs from Mt. Kaala.

Eupelmus sp.—Mr. Bridwell also reported rearing a native species of *Eupelmus* from *Neoclytarlus euphorbiae* from Ewa Coral Plain.

Bruchidae.—Mr. Bridwell spoke of the serious increase of *Bruchus salluci* in kiawe pods in Oahu. He reported that *B. limbatus* proves to be generally distributed on this side of Oahu, and that it occurs in the seeds of *Albizzia lebbek*, an Oriental tree, as well as in the seeds of the monkey pod and opiuma. It has also been bred artificially in the seeds of the gluebush and kiawe. It is striking that so many American southwestern species have become established here and attack plants or trees quite diverse. Mr. Bridwell further reported finding *Caryoborus* breeding sparingly in the seeds of *Caesalpinia sepiaria*, the wait-a-bit thorn, in the Kaukonahua gulch.

Coptotermes intrudens.—Mr. Ehrhorn reported on finding this termite destroying sweet corn in a garden on Sand Island. A pile of old lumber near-by was riddled by the termite, and this was probably the source of the colony attacking the corn.

Mr. Giffard spoke of the growing importance of white ants in the Islands, and Mr. Bridwell reported on what might be considered serious injury in the native forest by *Calotermes castaneus*, as he had found this species attacking living wood.

MAY 6th, 1920.

The 176th meeting of the Hawaiian Entomological Society was held in the entomological laboratory of the Hawaiian Sugar Planters' Experiment Station. President Crawford occupied the Chair and other members present were Messrs. Bryan, Ehrhorn, Rosa, Swezey, Timberlake and Willard. In the absence of the Secretary, Mr. Timberlake was appointed Secretary pro tem., and the minutes of the previous meeting were read and approved.

President Crawford reported no further developments in the

effort to secure the presence of noted entomologists at the Pan-Pacific Scientific Congress.

Mr. Willard reported that the committee appointed to consider the use of the loquat as a forest cover in relation to the fruitfly menace had not been able to meet as a body. He, however, stated that the unanimous opinion of the members of the committee was to the effect that as a general proposition fruit trees, including the loquat, should not be used for reforestation purposes. In a lengthy discussion entered into by Messrs. Ehrhorn, Swezey, Willard, Crawford, and Dr. Lyon, who dropped in as a visitor, there seemed to be a feeling that the use of the loquat in reforestation might be under certain circumstances a distinct benefit with regard to the parasitic control of the fruitfly, although there was hesitancy among the members of the Society to recommend its use. Dr. Lyon stated that he had proposed the use of the loquat as a barrier along the lower edge of the native forest on the Hamakua Coast, and that there was no fruit-growing industry in that part of the island which could be menaced by a possible increase of the fruitfly. The matter was laid over to the next meeting for further consideration.

NOTES AND EXHIBITIONS.

Ammophorus insularis.—Mr. Swezey exhibited four specimens of this beetle collected in Kaimuki by Horace Sharp, April 5, 1920. More specimens had been collected and some sent for determination to Dr. E. C. Van Dyke at Berkeley, Calif., who considers them to belong to *A. insularis* Boheman. The species was described in 1858 from Honolulu and had never been collected since.

Celerio perkinsi.—Mr. Swezey exhibited an adult of this endemic Sphingid reared from a caterpillar captured on *Kadua*, in Waialae Iki Valley on March 21, 1920. He also exhibited a caterpillar collected on *Kadua* at the same place, on May 2, 1920, and an egg from which 22 parasites (*Trichogramma semifumatum*) had issued a few days after being collected. Four eggs were collected and all were parasitized.

Hypocala andremona.—Mr. Swezey exhibited a specimen of

this moth reared from a caterpillar collected on *Maba sandwicensis* in Waialae Iki Valley, March 21, 1920.

Sternochaetus mangiferae.—Mr. Swezey reported finding mango seeds in Hilo infested by the mango weevil and that Bro. Matthias told him that he had known of this weevil there for several years.

Teratura sp.—Mr. Swezey reported that this new Locustid immigrant at Hilo, Hawaii, was apparently on the increase. Several specimens could be secured any evening at the Hilo Hotel, where they came to lights. All specimens were females, however, and it was not possible to find a male. Brother Matthias is having the same experience with this insect.

Monocrepidius exsul.—Mr. Swezey reported an investigation of the damage to sugar cane by wireworms at Honokaa, Hawaii, in which it was found that the wireworms were the larvae of this Elaterid, which has hitherto been considered predaceous. They were found in cane fields eating out the eyes of recently planted seed cane. This was in an area of several hundred acres and would necessitate much replanting.

The investigation brought out the presence of larvae of the Olinda beetle (*Pantomorus fulleri*) in most of the fields, and it is likely that their presence was the primary cause of the presence of the wireworms. Both larvae were found generally distributed in the plantation, occurring in cane stools of fields being plowed; in the stubbles of fields recently harvested; in standing cane about a year old, as well as in the recently planted fields.

Specimens of the other wireworm, *Simodactylus cinnamomeus*, were scarce in the fields investigated.

Tachinid parasite of *Corizus*.—Mr. Swezey exhibited a small tachinid fly reared from an adult bug of *Corizus hyalinus*. Six of these bugs were collected on *Sonchus* at Puuloa, Oahu, on March 24, 1920. A maggot issued from each of three of these bugs, but only one produced a fly. This may be the undetermined tachinid that Dr. Perkins refers to in the Introduction of the Fauna Hawaiiensis. It has been collected by Mr. Swezey at Naalehu, Hawaii, in 1905, and by Mr. Williams on the Ewa Coral Plain in 1920.

Coptotermes intrudens.—Mr. Swezey exhibited the stump of a pigeon pea bush brought in by Dr. H. L. Lyon from his garden, which was infested by this termite. The roots were partially dead and with large excressences produced by nematodes. The termites had entered from below and worked up through the dead or dying heartwood and were continuing their channels on up into the living wood.

Mr. Ehrhorn reported that he had found this termite doing considerable damage in the lumber yards of the city, and that it always entered the lumber by covered runways connecting with the ground. He had experimented with carbon bisulphide poured into their channels and runways with such good results that the lumber company had continued the work of destruction by the same method.

Mr. Crawford inquired whether the species could establish new colonies by the swarming of the winged stages, and Messrs. Swezey and Ehrhorn believed that new colonies must be established in this way.

Black-banded Anthomyid.—Mr. Timberlake exhibited a series of this fly collected at Kaimuki during the past few months. He reported that this new immigrant is now rather common and can frequently be seen sunning itself on tree trunks, but it is rather difficult to capture.

JUNE 3rd, 1920.

The 177th meeting of the Hawaiian Entomological Society was held at the usual place.

In the absence of the President, Mr. Timberlake was authorized to conduct the meeting. Members present were: Messrs. Ehrhorn, Swezey, Timberlake, Rosa, Bryan, and Fullaway.

The minutes of the previous meeting were read and approved with corrections.

Mr. Swezey spoke of the plans concerning the Pan-Pacific Congress to be held in Honolulu in August.

ENTOMOLOGICAL PROGRAM.

A New Grass Leafroller, Omiodes giffardi (Lepidoptera).

BY O. H. SWEZEY.

Omiodes giffardi n. sp.

Male. 27-32 mm. Antennae brownish fuscous; palpi brownish fuscous, basal segment white below; head and thorax pale fuscous suffused with whitish; abdomen pale fuscous with white apical margins to segments, anal tufts of male dark fuscous; forewings fuscous suffused with pure white, the costa conspicuously fuscous, a darker fuscous oblique streak from tornus to cell and following the dorsal side of outer half of cell, then across end of cell, including discocellular fuscous dot; a fuscous dot about middle of cell; second line white nearly straight across wing at about three-fourths, followed by a stronger fuscous streak; a terminal series of dark fuscous triangular dots, situated between veins; cilia whitish fuscous, a little darker at base. Hindwings light fuscous, with a darker discal dot and a submedian whitish line bordered on both sides with darker fuscous; a nearly continuous terminal fuscous line; cilia as in the forewings. Legs cinereous.

Very closely similar to *O. accepta* (Butl.), but differs especially in the pure white suffusion of the forewings, whereas the whitish markings in *accepta* are with an ochreous tinge; the dark fuscous markings are about the same, but appear more distinct in *giffardi* on account of the contrast with the white suffusion. In *giffardi*, the dark fuscous suffusion beyond second line is not interruptedly paler on the veins as in *accepta*.

Described from three male specimens. Two collected at light by Mr. W. M. Giffard at his bungalow, Kilauea, Hawaii, September, 1911, and September, 1919. One reared by the writer from larva on a grass (*Isachne distichophylla*) at Kilauea, Hawaii, April 22, 1920. The caught specimens are somewhat broken; the reared specimen is the type.

Holotype in collection of Hawaiian Entomological Society; paratypes in collection of Hawaiian Sugar Planters' Experiment Station.

The first two caught specimens were considered by the writer as specially white forms of *accepta* (See Proc. Haw. Ent. Soc., II:235, 1913). When he discovered several larvae on the grass above mentioned at Kilauea, and succeeded in

rearing one moth from them, which was of this white form, he was convinced that this was a different species, especially as the larvae had different markings from those of *accepta*, there being more of the blackish markings on the thoracic segments. Unfortunately no description was made of the larvae, nor any of them preserved. More of these will be looked for on the next visit to the place.

This makes the fifth native species of *Omiodes* whose larvae feed on grass, the others being: *accepta* (Butl.), *continuatalis* (Wall.), *demaratalis* (Wall.), and *localis* (Butl.). Of these, *accepta* is the most abundant, and also feeds on sugar cane, sometimes doing considerable injury.

Notes on Proterhinus abnormis, a Leaf-Miner in Leaves of Broussaisia arguta (Col.).

BY O. H. SWEZEY.

The larvae of *Proterhinus abnormis* Perkins mine the leaves of *Broussaisia arguta* very abundantly on Mt. Kaala, the highest mountain on Oahu. On a trip there May 18, 1920, I collected a number of the beetles. They are found between the unexpanded leaves at the tips of growing branches of the tree. A few were found on the under side of mature leaves, where they oviposit. In doing this a small round excavation is made in the under side of the leaf, or in a vein, the egg deposited in the hole and covered with a little substance apparently obtained by chewing up the hairs and surface of the leaf in a circle about the place where the egg has been deposited. This circle is quite noticeable on the under surface of the leaf (Fig. 1a). Sometimes it is a ring 3-5 mm. in diameter, but frequently the whole surface of the circle has been chewed over and has a pale brownish appearance. There may be from one to ten of these per leaf.

The egg is whitish and very soft, about .4 mm. in diameter. The irregular mines are well shown in the figure (Fig. 1b). The larva is yellowish when full grown and ready to pupate.

Transformation to the adult takes place within the mine, usually where it is in the midrib.

Proterhinus phyllobius Perkins, which similarly mines the leaves of *Broussaisia arguta* on Tantalus, Kaumuahona and Olympus of the Koolau Range, does not make circles as above when ovipositing. The chewing on the leaf for material to cover the egg is done irregularly. This is the insect treated of in "A Leaf-Mining Proterhinus" in Proc. Haw. Ent. Soc., II:212 and 226, 1913. The name *P. excrucians* there used for it was apparently an error in determination.

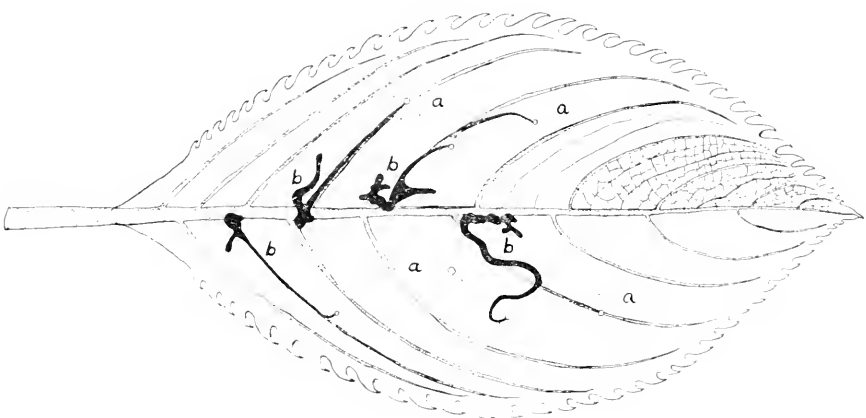


Fig. 1. Leaf of *Broussaisia arguta* with mines of *Proterhinus abnormis*.
a. Places where eggs have been inserted.
b. Mines produced by the larvae.

NOTES AND EXHIBITIONS.

Thoracaphis fici.—Mr. Fullaway placed on record the occurrence of *Thoracaphis fici* Van der Goot in Hawaii. Specimens were collected on *Ficus* March 22, 1918, by Mr. Van der Goot.

Toxoptera aurantiae.—Mr. Timberlake recorded finding *Toxoptera aurantiae* on the tender shoots of mango in Honolulu.

Nesodryas giffardi.—Mr. Swezey exhibited a nymph of this native Delphacid having a Dryinid larva on the under side of

the abdomen. It was taken May 30 at Waiahole on leaf of *Cyrtandra*. Two specimens were seen, but only one secured. This is the first instance of the occurrence of a Dryinid larva on the ventral side of a native Delphacid host, they usually being on dorsal side.

Calandra remota.—Mr. Swezey exhibited 65 specimens of this weevil found at base of one banana plant in his garden at Kaimuki, May 27, 1920. They were beneath the dried-up leaf sheaths, but apparently had matured from larvae that had fed in the corm below the surface of the ground.

Nesiomiris.—Mr. Timberlake exhibited a series of seven species of this endemic genus of Miridae, all of which are sufficiently similar to agree with the description of the single species described, *N. hawaiiensis* Kirkaldy. They are easily separated by the genitalia of the male, the characters being easily seen without dissection. The males are usually dark green and the females paler or more yellowish green. Two species have been found on Oahu, on *Byronia* and *Reynoldsia*, three taken on Haleakala, Maui, one of these on *Byronia*, and three collected in Kona and Kau, Hawaii, on *Byronia*, *Cheirodendron*, and *Reynoldsia*, the one on the last-mentioned tree being the same as the Oahu species on the same plant.

Maui and Hawaii Insects.—Mr. Timberlake exhibited a collection of insects made during the summer of 1919 on Maui and Hawaii. In the collection was a specimen of *Sulamita lunalilo*, taken on *Freycinetia arborea*, at Kealakekua, Kona, Island of Hawaii, 3500 feet elevation; also a specimen of *Orothreptes callithrix*, taken on *Pisonia*, in the same locality.

JULY 1st, 1920.

The 178th meeting of the Hawaiian Entomological Society was held in the usual place. In the absence of the officers, Mr. Giffard presided and appointed Mr. Timberlake as acting Secretary. Other members present were Messrs. Ehrhorn, Muir,

Rosa, Swezey, Wilder, and Willard, with Mr. L. A. Whitney, visitor.

The minutes of the previous meeting were read and approved with a few minor corrections.

Mr. Ehrhorn brought up for the consideration of the Society whether the Coccid, *Antonina australis*, brought back from Australia by Mr. Muir, should be liberated. Mr. Muir stated that he had observed a field of sugar cane in ratoon in which the *Antonina* had killed 90 per cent of the nutgrass and prevented it from flowering. He had also observed that the nutgrass in cane fields is all seedling and that as soon as it forms corms the Coccid begins to multiply and gradually kills it off. Mr. Muir further stated that he had never found it on sugar cane, but had found it on various grasses and other Cyperaceae. On the other hand, he had observed that the nutgrass is quite as bad in Australia as in Hawaii. Mr. Giffard also mentioned that the *Antonina* was recorded on buffalo grass, which is a valuable forage grass in Hawaii. The question was laid over for further discussion. Mr. Muir stated further that the species on grass brought from Australia is distinct from the one on nutgrass.

NOTES AND EXHIBITIONS.

Thoracaphis fici.—Mr. Ehrhorn mentioned that this aphid on *Ficus* had been known previously and was collected by Dr. Perkins some ten years ago.

Amblychila baroni.—Mr. Giffard exhibited a specimen of this tiger beetle taken in the Huachuca Mountains, Arizona, which he was presenting to the H. S. P. A. collection to take the place of the type specimen turned over to the California Academy of Sciences from the Baron and Harford collection. He also spoke of the rarity of this species in collections, and read a few extracts from the writings of Walther Horn concerning the latter's quest for it.

Coreid from Queensland.—Mr. Muir exhibited specimens of a *Coreid* which he had collected in North Queensland. He stated that this species is interesting in that it kept down all

mosquito larvae in standing water, but that it is not found in temporary pools or puddles.

Sternochaetus mangiferae.—Mr. Swezey spoke of the prevalence of the mango weevil during the present season. Thus out of ten mango seeds from Kaimuki he had found all infested, and out of ten from Kalauao all were infested. Mr. Wilder stated that he had also noticed that the weevil was very prevalent this year.

Fleas on mongoose.—Mr. Swezey exhibited specimens of an unidentified flea found recently on a young mongoose at Manoa Valley.

AUGUST 12th, 1920.

The 179th meeting of the Hawaiian Entomological Society was held in the usual place.

Present: Crawford, presiding; Williams, Grinnell, Muir, Osborn, Swezey, E. H. Bryan, Rosa, and Fullaway.

Reading of minutes of previous meeting deferred.

A vote of thanks was passed to Mr. Swezey for editing the Proceedings for 1919.

Mr. L. A. Whitney was unanimously elected to active membership in the Society.

ENTOMOLOGICAL PROGRAM.

Preliminary Notes on the Genus Tephritis in Hawaii (Diptera).

BY E. H. BRYAN, JR.

The Fauna Hawaiiensis records three species of *Tephritis* in Hawaii. Of these *T. crassipes* had been described as *Trypeta crassipes* by Thomson in Kongliga Svenska Fregatten Eugenies Resa Omkring Jorden, part II, page 583, the Zoological results of the voyage of the Frigate l'Eugenie around the world in 1851-1853. Grimshaw placed this in the genus *Tephritis* and added the two new species, *T. limpidapex* and *T. cratericola*.

February 3, 1910, Mr. Terry, who had done some very valuable work on Hawaiian Diptera, exhibited specimens and read a note on "A New Oahuan Trypetid, *Tephritis dubautiae*," before the Hawaiian Entomological Society. (See Proceedings, II:147, 1912.) This paper was not published at the time, and it, with many other valuable notes, became lost at the time of Mr. Terry's sudden death on November 7, 1911. His specimens, however, have been preserved, and we have endeavored to redescribe these, using the original name of *Tephritis dubautiae*.

In 1906 a specimen of *Tephritis*, totally distinct from any of these four, was captured in Palolo Valley, the collector being unknown. In 1912 Mr. Swezey added two more specimens, one in March from Kaumuahona and one in September from Pacific Heights on *Dubautia*. On November 17, 1918, Mr. Swezey bred three more specimens from *Dubautia* taken on Kaumuahona. Although these specimens are not identical in wing pattern, yet in our mind they are similar enough to constitute a single species, which we here describe as *Tephritis swezeyi*. Another specimen taken August 29, 1918, by Mr. Swezey on Haleakala is similar, but cannot be placed in the same species. All these specimens are characterized by very dark fuscous wings, bearing an irregular number and arrangement of hyaline spots.

KEY TO THE HAWAIIAN TEPHRITIS.

a. Wings without large, conspicuous, fuscous spots; pattern—a simple network; front purplish; thorax and abdomen slaty-gray. *Tephritis limpidapex* Grimshaw

a′. Wings with two large fuscous spots; the larger extending from costa to 4th longitudinal vein, toward the apex of the wing, beyond the posterior cross-vein, containing one or more small hyaline spots; smaller fuscous spot in the 3rd sub-costal cell; spots and margins of wing connected by fuscous network; front yellow or reddish-brown.

b. Legs dark, black or reddish-brown; abdomen elongate, terminal segments shining black; antennae black. *Tephritis cratericola* Grimshaw

b′. Legs light, yellow-brown; abdomen and thorax plum colored, with white tomentum; front and antennae yellowish.

c. Size larger (length 4 to 5 mm.); 3rd sub-costal cell with hyaline spot in apex. *Tephritis crassipes* (Thomson)

c′. Size smaller (length 2 to 3 mm.); fuscous spot in 3rd sub-costal cell encloses a large hyaline spot in its center, leaving only a ring of fuscous. *Tephritis dubautiae* sp. n.

a″. Wing entirely dark fuscous, with a variable number and arrangement of hyaline spots; thorax bluish gray, white shagreen, with three darker longitudinal stripes; abdomen concolorous, last segment in female shining brown. *Tephritis swezeyi* sp. n.

DISTRIBUTION OF THE SPECIES OF TEPHRITIS IN HAWAII.

Tephritis crassipes (Thomson).

Hawaii: Kona, 4000 ft. (*Perkins*); Pahala, Hakalau (*Swezey*).

Kauai: 2000-3000 ft. (*Perkins*).

Oahu: Honolulu (*Thomson, Bridwell*); Waianae Mts., 3000 ft. (*Perkins*); Honolulu, on *Coreopsis* (*Terry*);

Honolulu and Mt. Tantalus (*Giffard* and *Terry*); Palolo, ex *Campylotheca* (*Swezey*); Konahuanui, Mt. Olympus, on *Campylotheca*, Manoa ex *Bidens*, Kuliouou on *Lipochaeta calycosa*, Mt. Kaala (*Timberlake*); Kaumuahona (*Bridwell*).

Maui: Kaupo Gap, 7000 ft., Hana (*Terry*); Haleakala Crater (*Terry* and *Swezey*); Kipahulu (*Swezey*).

Tephritis cratericola Grimshaw.

Maui: Haleakala Crater, from Silver sword (*Perkins*, *Terry* and *Swezey*); Gulch near Puu Nianiau, 6200 ft., rim of Haleakala Crater, 8000 ft., swept from *Eupatorium* (*Timberlake*); Haleakala, 10,000 ft., ex *Raillardia* (*Rock*); Gulch near Puu Nianiau, 6200 ft., ex flower head of green sword (*Swezey*).

Hawaii: Kilauea on *Raillardia* (*Swezey*).

Tephritis dubautiae sp. n.

Oahu: Ohulehule, Koolau Range ex *Dubautia plantaginea* (*Terry*); Wahiawa ex *Campylotheca* (Forbes); Lanihuli (*Bridwell*); Kaumuahona, Rooke Valley, Mt. Kaala ex *Dubautia* (*Swezey*).

Tephritis swezeyi sp. n.

Oahu: Palolo, Olympus, Pacific Heights, Kaumuahona ex *Dubautia* (*Swezey*).

Tephritis sp.

Maui: Haleakala (*Swezey*).

Tephritis dubautiae sp. n.

Tephritis dubautiae Terry. Proc. Haw. Ent. Soc. II, p. 147, 1912. (Nomen nudem).

Long. 2-3 mm. al. 2½-3 mm. Front dark cinereous, much excavated between the orbits; orbits lighter, each bearing five bristles. Occiput with single row of pale setae. Face cinereous; proboscis and palpi light yellowish. Antennae yellow-brown, basal joints paler.

Thorax bluish-gray, with fine white pubescence; each side with 9

macrochaetae:—1 humeral, 1 praesuteral, 1 notopleural, 1 supraalar, 1 interalar, 1 postalar, 2 dorsocentral, 1 scutellar.

Abdomen flat; (male) ovate in outline, (female) with long, pointed ovipositor; fuscous or similar to thorax in color, covered with white hairs.

Legs entirely yellow-brown; middle tibia spurred.

Wings hyaline, with much lighter fuscous, reticulate pattern than *T. crassipes* or *T. craterícola*, but similar to them. The spot in the apex of 3rd sub-costal cell encloses a large hyaline spot, which reduces it to a fuscous ring. The large subquadrate fuscous patch toward the apex of the wing, between the costa and 4th vein, includes from none to 4 small hyaline spots along the costal and apical edges. It sends forth two fuscous rays to the apex, along the 3rd and 4th longitudinal veins, and three toward the posterior border of the wing, (2 crossing middle of 2nd posterior cell and 1 along posterior transverse vein). Remaining posterior reticulations very pale.

Habitat:—Oahu: Ohulehule, ex *Dubautia plantaginea* (*Terry*); Wahiawa, ex *Campylotheca* (*Forbes*); Lanihuli (*Bridwell*); Rooke Valley, Kaumuahona and Mt. Kaala ex *Dubautia* (*Swezey*).

Tephritis swezeyi sp. n.

Long. 4½-6 mm. al. 5-6 mm.

Front fuscous and light brown, vertical triangle purplish, with 3 ocelli shining reddish brown; frontal orbits of eye lighter, each bearing 5 large, black bristles; 2 smaller, forward pointing vertical bristles; occiput with single row of pale setae; proboscis, palpi and cheeks yellow-brown, covered with small black bristles; antennae with the two basal joints yellow-brown, third joint subovate, fuscous, with a dorsal, slightly pubescent arista.

Thorax bluish gray, white shagreen and with white pubescence; three more or less distinct, darker longitudinal stripes, much enhanced by the absence of the white pubescence; median stripe narrower and less distinct, scutellum concolorous, with a broad wedge-shaped, darker central band. Ten macrochaetae on each side as follows: 1 humeral, 1 post-humeral, 1 notopleural, 1 supraalar, 2 dorso central, 2 postalar and 2 large scutellar. Plurae light fuscous, halteres yellow-brown. Legs entirely yellow-brown; apex of middle tibia with single large bristle and crown of shorter spines.

Abdomen same color as thorax or lighter, covered with white pubescence and small black hairs, and with strong black bristles on the margins of the segments and sides. Last segment of female dark brown, shining, longer than two preceding segments, bluntly pointed and covered with fine black hairs. Last segment of male abdomen sheath-like, covering genital segments.

Wings fuscous; anterior half darker. Dark fuscous spot in apex of

sub-costal cell. Covered with a variable number and arrangement of white spots, the most constant being as follows: Marginal cell with 6-8 small white spots near costa; 1st submarginal cell with 4-6 small spots in basal half and two at apex near costa; 2nd posterior cell lighter fuscous with 6-8 white spots; discal cell with 12-15 white spots of various sizes; 3rd posterior cell with 10-14 large white spots, roundish; anal and axillary cells, which are separated by a short 6th vein, each with 4 large white spots on a light fuscous field.

Habitat:—Oahu: Palolo, Olympus, Kaumuahona, and Pacific Heights (*Swezey*). The larvae are found singly in terminal buds of *Dubautia*.

Tephritis (Trypeta) crassipes Thomson.*

Dark fuscous, bluish gray, head with antennae and feet yellow, wings white, moderately reticulated with fuscous, with 2 large costal spots of blackish-brown including a white spot on the costa, and sending out 2 lateral rays toward the apex of the wing.

Habitat:—Honolulu.

The ornamentation of the wings similar to *T. leontodontis*, with the anal cell not at all angulated beneath; scutellum with 2 bristles, front on both sides with a row of 5 bristles, usually distinct. Head as broad as thorax, pale yellow-brown, occiput almost truncate, red-brown over the middle; front a little longer than broad, with 5 bristles on both sides, the epistoma short, furrows of the antennae parallel, sufficiently discrete; peristome somewhat rounded, proboscis short, never jointed, pale; eyes rather large, descending below, frontal orbit directed anteriorly, almost converging, facial ones a little diverging. Antennae short, somewhat deflected, bases almost contiguous, pale yellow-brown, 3rd joint rounded, apical angle slightly obtuse. Thorax fuscous, humeri paler, densely clothed with bluish gray, plum colored pubescence; a pair of dorsal bristles placed a little before the middle; scutellum somewhat acute at the apex with 2 bristles.

Wings somewhat hyaline, partly reticulated; base dotted and streaked with 5-6 brown lines; costal spot fuscous, including a white spot at the apex of the sub-costal cell; obliquely below are 5 or 6 white spots. The superior spots are small, sometimes obsoletely noticeable. The posterior spot somewhat round, dark fuscous, including a little spot adhering to the border at the apical marginal branch. Anterior band and four larger costal spots sending out 2 broad diverging branches toward the apex, including a white spot and sending below two entire branches. Infuscation of discal transverse nerve quite broad, 2 whitish spots below cohering with the posterior spot and the common transverse vein. Costal abscission

* Translation from Eugenies Resa, Part II, p. 583, 1868.

armed with two distinct spines; 5th vein half as long again as the 6th; posteosta (sub-costa) reaching the middle of the wing; arms and branches of the cubitus submarginal plainly parallel behind. Transverse vein of the discal cell never behind the middle of the wing, but situated behind the end of the sub-costa, prolonged to the 5th posterior cell. Anal corner almost straight below.

Abdomen fuscous, covered with bluish, faun-colored pubescence and short, pale, depressed hairs. Apex of 5th segment decorated with 6 black spines; 6th segment of the female shining black, depressed, twice as long as the preceding. Feet rather powerful, pale yellow brown. Anterior femora fitted below with 4 or 5 bristles.

On Some Delphacidae from South India (Homoptera).

BY F. MUIR.

Through the kindness of Mr. E. A. Butler I have received a small but interesting collection of Delphacidae made by Dr. T. V. Campbell in British India. It consists of eight genera and ten species, one genus and four species of which I consider as new. *Columbisoga campbelli* was taken at an elevation of 8000 feet in South India, and its nearest ally is known from 10,500 feet in Columbia, South America.

My thanks are due to Dr. Campbell and Mr. Butler for the collection.

Measurements are from the apex of vertex to apex of abdomen, and from the base to apex of one tegmen. The types have been deposited in the collection of the Hawaiian Sugar Planters' Experiment Station, Honolulu.

Tropidocephalini.

Tropidocephala signata (Distant).

Orchesma signata Distant (1912) A. M. N. H. (8). IX, p. 192; (1916) Faun. Brit. Ind. Rhynchota VI, p. 142, f. 102. Two female specimens from Chikkaballapura, South India (*T. V. Campbell*).

As the genus *Tropidocephala* stands at present I am unable to separate it from *Orchesma*. Distant (1916 t. c. p. 465) uses

the proportion of length to breadth of the face, but as this varies with the length of the vertex, it is of no generic value.

The species in the collection of the Hawaiian Sugar Planters' Association, Honolulu, can be divided as follows:

a. Apex of face truncate, no keel dividing the face from clypeus; clypeus in profile in line with face or but slightly angled. *T. brunnipennis; dryas; festiva; saccharivorella; neogracilis; atrata; nigrocacuminis; malayana; butleri; indica.*

b. Apex of face rounded, the lateral carinae continuing to middle and forming a carina between face and clypeus; clypeus in profile nearly at right angle to face. *T. amboinensis; saccharicola; neoelegans; neoamboinensis; baguioensis; pseudobaguioensis; formosana; signata.*

I have not seen *flaviceps* Stal, the type of the genus, so I cannot say into which of the groups it will fall, and Stal's description gives no indication. Fieber[1] in describing the genus as based upon *elegans* Costa, says: "Front transversalement convex audessus du clypeus," which would very well describe the condition found in group B. If *flaviceps* belongs to group A and *elegans* to group B, then it might be convenient to use Costa's genus *Nephropsia*. The type of *Orchesma* Mel., *marginepunctata* Mel., comes into group A. Until these three types have been compared and adequate distinctions pointed out, I shall group them all under the one name.

Tripidocephala butleri sp. n.

Male. Macropterous; vertex three times the length of pronotum, carinae of vertex large, face slightly narrowed near base between eyes, apex truncate, no carina dividing it from clypeus; carina across gena obscure; clypeus rounded, tumid, without carinae; a distinct carina from behind eye to tegula making the pronotum 5-carinate.

Pygofer in profile entire, very shallowly emarginate on dorsal edge, medio-ventral edge deeply and roundly emarginate with the corners slightly produced and a small spine-like projection from the bottom of the emargination; anal segment small, hind margin straight all round, a single, strong, curved spine arising on right side near base and lying along side the aedeagus; the latter is semitubular, thickest at base, curved and slightly recurved at apex; genital styles similar to those of

[1] Rev. Mag. Zool. 1875 (3). III, p. 368.

T. saccharicola Muir,[1] broadest at base where there is a small projection, situated far within the pygofer.

Orange buff or light cadmium orange, carinae of vertex and thorax lighter with a small fuscous mark on each side of median carina at apex of vertex; apex of first joint of antennae and two rings on second fuscous; apices of genital styles black. Tegmina hyaline, light cadmium over cross veins and median portion of apical cells, a narrow, faint mark from middle of costal cell to apical portion of clavus and over apical portion of claval cells, a black spot at apex of first and second subcosta, radius and first media, a black mark on hind margin beyond clavus broken by the light Cu 1a; veins light, granules fairly numerous, white, bearing white macrotrichia; wings hyaline with brown veins. Length, 2.8 mm.; tegmen, 3.4 mm.

Female; macropterous. In color light green in place of cadmium orange. Tegmina hyaline with exceedingly faint or no markings, the black spots at apex of subcosta, radial and first media minute; no dark mark on hind margin beyond clavus. Length, 3.3 mm.; tegmen, 3.4 mm.

Described from three males and three females from Kodai Kanal, South India *(T. V. Campbell)*. Type No. 1024.

Tropidocephala indica sp. n.

Male. Macropterous; vertex 1.4 times the length of pronotum; pronotum 5-carinate the shoulder carinae from back of eyes to tegulae distinct; no carina dividing frons from clypeus.

Genitalia on the same plan as *T. butleri*, the medio-ventral emargination of pygofer wider with the projection at bottom larger and broader; the genital styles more slender and the apex turned nearly at right angle, the basal projection larger with its apex long and acute; anal spine thin and curved.

Cadmium orange; carinae lighter, the medium carinae of vertex and nota distinctly edged with black; apex of first and two thin rings on second antennal joints black; the projection at bottom of medio-ventral emargination of pygofer, the apices of genital styles and the spine-like projection at base, black. Tegmina hyaline, slightly tinged with cadmium orange, veins slightly darker, granules fairly numerous, irregular and bearing dark macrotrichia; wings hyaline, veins brown. Length, 2.2 mm.; tegmen, 3.2 mm.

Female; macropterous. Similar to male but the color less bright, nearer to raw sienna. Length, 2.7 mm.; tegmen, 3.2 mm.

Described from two males and two females, the type couple from Kodai Kanal, the others from Devuaga Drug, South India (*T. V. Campbell*). Type No. 1025.

[1] Proc. Haw. Soc. II. 5, (1913). Pl. 6, figs. 7, 7a.

The above described species differ from all others of the genus that I am acquainted with by having a distinctly 5-carinate pronotum.

Columbisoga gen. n. figs. 1, 2, 3.

Type *campbelli*. Width of vertex at base but slightly greater than length, apex half the width of base, sides straight, apex projecting angularly in middle showing the small V at base of face, an obscure, simple carina down middle, a small pit on each side near base; base of vertex sinuous, about middle of eyes; length of face three times the width, widest in middle, sides slightly arcuate, lateral carinae distinct, median carina with a minute fork at base which projects beyond vertex in dorsal view; transverse carina on gena distinct; clypeus tricarinate on basal two thirds, curved on apical third; antennae barely reaching base of clypeus, both joints terete, second joint twice the length of first, first slightly enlarged at apex; pronotum tricarinate, lateral carinae convergingly curved, reaching hind margin, a small pit on each side near middle; mesonotum tricarinate; hind femora not reaching to apex of abdomen, much shorter than tibia, tarsi shorter than tibiae, first tarsus about equal to the other two together, spur nearly as long as first tarsus, thick, concave on inner surface, a small tooth on apex, none on hind margin. Media touching both radius and cubitus; forking of subcosta and radius and the forking of cubitus about the same level.

This genus belongs to the Tropidocephalini and comes near to *Columbiana* Muir[1] and *Sogatopsis* Muir,[2] but nearer the former. It can be distinguished from *Columbiana* by its longer and narrower face, by the shape of the vertex which has an obscure, simple median carina and no Y, and by the lateral carinae of the pronotum curving inward and reaching the hind margin. *Sogatopsis* can be distinguished from it by the angular basal joint of antenna, the rounded apex of vertex, shorter face, and the presence of a cross-vein between the media and radius and media and cubitus.

Columbisoga campbelli sp. n. figs. 1, 2, 3.

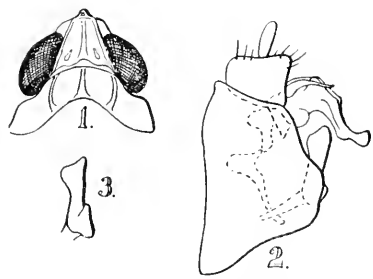
Male. Macropterous; light chestnut, lighter over carinae of vertex and thorax, especially the median carinae; abdomen darker. Tegmina dark chestnut except the hyaline spot over the middle of median and extending into radial cell, and hyaline in first four apical cells; veins

[1] Can. Ent. 1919, p. 35, figs. 6 a, 7 a.

[2] Pro. Haw. Ent. Soc. II. 5. (1913) p. 247

darker with many irregular, small granules bearing black macrotrichia; wings hyaline with dark veins.

Pygofer with edge entire, opening about as wide as long; anal segment small, without spines; styles small, obliquely truncate at apex, narrowed slightly in middle with a small projection near base; aedeagus



Columbisoga campbelli.

1. Dorsal view of head and pronotum.
2. Lateral view of genitalia.
3. Left genital style.

large, slightly compressed laterally, broadest at base, strongly curved before middle, the apex rounded, a strong curved spine arises from the dorsal edge of the base, curves over and lies along the left side. Length, 2.8 mm.; tegmen, 4.2 mm.

Female; macropterous. Similar to male but lighter in color, especially the tegmen; the granules along veins light in color. Length, 3.5 mm.; tegmen, 5.2 mm.

Described from two specimens from Dodabetta Hill, Ootokamund, Nilgiri Hills, South India, elevation 8000 feet. On bamboo (*T. V. Campbell*). Type No. 1026.

Pundaluoya ernesti (Kirby).

One male and one female from Chikkaballapura, South India (*T. V. Campbell*). The female is considerably lighter in color than the male and confirms my remarks elsewhere[1] that *P. simplex* (Kirby) is only the light colored female of *P. ernesti.*

[1] Can. Ent. (1919) p. 7.

DELPHACINI.

Perkinsiella insignis (Distant).

Pundaluoya insignis Distant (1912) A. M. N. H. (8). IX, p. 190; (1916) Faun. Brit. Ind. Rhynchota VI, p. 135; Muir (1919) Can. Ent., p. 7.

One male specimen from Chikkaballapura, South India. The medio-ventral edge of pygofer forming a plate with each apical corner drawn out into a short, flat spine; the anal spines long and thin reaching nearly to base of genital styles which are slightly curved.

Phyllodinus pulchellus (Distant).

Pundaluoya pulchella Distant (1912) t. c. p. 190; (1916) t. c. p. 135; Muir Can. Ent. 1919, p. 7.

One female specimen from Chikkaballapura, South India (*T. V. Campbell*).

Sardia campbelli sp. n.

Male. Macropterous; head greatly produced in front, vertex half the length of thorax and abdomen, base slightly wider than apex, lateral carinae well developed, an obscure median carina on basal fourth faintly furcate at apex; frons long and narrow, lateral margins carinate and subparallel to near base where they become obscure, the lateral carinae of vertex contined on to middle of frons separate to middle where they form a single carina, in lateral view apex truncate, a carina from front of eye to near apex where it becomes obscurely fused with lateral carina of frons; clypeus small, tricarinate, curved at apex; antennae small, reaching base of clypeus, basal joint about as long as wide, second joint about double the length of first. Pronotum tricarinate, lateral carinae convergingly curved, not quite reaching hind margin. Tibial spur large, thin, laminate, with many small teeth on hind margin.

Black; antennae, legs and base of abdomen yellow or light brown. Tegmina black or deep fuscous, veins slightly darker with minute granules bearing black macrotrichia; wings lighter fuscous with dark veins.

Pygofer opening about as wide as long, margins entire, dorsal emargination deep with the anal segment sunk into it; anal spines slender, near together at base but not contiguous; genital styles flat, short, truncate at apex. Length, 3 mm.; tegmen, 2.7 mm.

Described from three specimens, one of them, the type, from Coonoor, Nilgiri Hills, 5000 feet elevation, and two from Lovedale, Nilgiri Hills, 7500 feet elevation, on grass in marshy places. Type No. 1027. I have taken Australian species in a similar situation in the lowlands.

Female. Brachypterous; vertex only one-third the length of thorax and abdomen. The median carina of face simple, otherwise the carination similar to the male. Tegmina reaching to posterior margin of sixth abdominal segment, rounded at apex.

Color similar to male but lighter, the carinae of head and thorax brown. Tegmina brownish with similarly colored veins. Length, 2.8 mm.; tegmen, 1.2 mm.

Described from two females from Kodai Kanal, South India. It is possible that they are the females of a distinct species, but only the capture of the male will settle the question.

There is a tendency for species of this genus to vary in the length of the head and this one only differs from the genotype in the amount of the elongation.

Gelastocephalus fasciatus (Distant).

Akilas fasciatus Dist. (1916) Faun. Brit. Ind. Rhynchota, VI, p. 138, f. 99.

One female from Kodai Kanal, South India *(T. V. Campbell)*. After comparing it with the type of *Gelastocephalus* Kirk. I can find no generic differences. The length and shape of the tegmina in these brachypterous specimens is not of generic value.

Megamelus furcifera (Horv.).

One male and one female, the former from Chikkaballapura and the latter from Mandidrug, South India *(T. V. Campbell)*.

A Dermestid Infesting Garden Seeds (Col.).

BY O. H. SWEZEY.

June 4, 1920. In a tin biscuit box (8" x 9" x 7.5") in which Dr. H. L. Lyon had garden seeds stored, were found great numbers of a Dermestid * beetle. The garden seeds of various kinds had been placed in the box in 1918, late in the year. According to Dr. Lyon the box had not been opened during the intervening time. It is impossible to account for the great abundance of beetles, except that a very few unnoticed specimens were in one or more of the packages of seeds at the time when put in in 1918. The box was closed sufficiently tight so that it hardly seems possible that any beetles could have got in, especially as there was nothing which would seem to be attractive to them.

The box and contents were put in a fumigating box and fumigated with carbon bisulphide and all beetles killed before a thorough examination of contents was made. Among the packages of seeds were several that had not been opened, having come from W. Atlee Burpee & Co., Philadelphia, Pa. Others had been opened at some time and probably some of the contents used. They were mostly in paper packages but two or three were in cloth bags.

The seeds badly eaten were sweet corn, both in package and on the ear. The embryo part of the kernels was first eaten, then considerable of the starchy portion as well, so that there were only fragments of the kernels left. Yellow field corn was not so badly eaten, nor white Guam corn.

Other seeds badly eaten were:—Milo maize, tomato, ground almond, carrot, martynia, fordhook squash and bachelor button.

Seeds only slightly eaten:—Peas, radish, alfalfa, papaia, Swiss chard, Russian sunflower.

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* Specimens were later sent to Dr. E. C. Van Dyke who determined it as *Eucnocerus anthrenoides* Sharp (?), a species found in Mexico and Panama. (Ed.)

Only broken seeds eaten:—Pumpkin and pole lima bean.

Seeds not eaten:—Golden wax bean, black wax bean, white egg-formed gourd, beet, bauhinia, red sunflower, climbing mallow and salsify.

This Dermestid had not previously come to our notice, but Mr. Timberlake finds that he has a specimen taken last year, probably at the Experiment Station laboratory. We are unable at present to distinguish the species, there being several species that are very similar.

New Maui Records.

BY O. H. SWEZEY.

Chrysopa sp.—The undetermined immigrant first recorded in Honolulu in 1919. Lahaina, July 6, 1920. Two reared from larvae on *Cassia gaudichaudii* infested with a mealybug, *Pseudococcus virgatus*. Puunene, July 9, 1920. A larva seen on cane leaf infested with *Aphis sacchari*.

Epyris extranea.—Hana, July 14. Taken on window. Previously known in middle and west part of Maui.

Megachile timberlakei.—2 males at Puunene, July 9.

Trypoxylon bicolor.—Waihee, July 11; Iao Valley, July 12; Keanae, July 17.

Hydrobius sp.—Iao Valley, July 12.

Caryoborus gonager.—Lahaina in Tamarind pods, July 6.

NOTES AND EXHIBITIONS.

Rhyncogonus blackburni.—Mr. Williams recorded the capture of 27 adults of this weevil on *Scaevola chamissoniana* on a hillock in Monoa Valley August 1, 1920. Heretofore they have usually been taken sparsely. They had been feeding on the *Scaevola* leaves and some were copulating.

Silaon rohweri.—Mr. Williams recorded finding a nest of this wasp in a cactus twig, part of the hedge around the grounds of Punahou College, Honolulu, July 20th, 1920. Five adults emerged later.

Cyrtorhinus mundulus (Bred.).—Mr. Muir stated that this predacious bug was introduced into Honolulu on June 21, 1920, to prey upon the eggs of *Perkinsiella*. The first liberation was on July 12th, 1920, at Ewa. Three weeks later recently hatched young were found.

**Nesithmysus* n. sp.—Mr. Swezey exhibited a specimen of an undescribed species of this recently described genus of Cerambycidae. The beetle was picked up by Mr. Chas. Haas on the upper part of the Wahiawa trail July 4, 1920. It will be the second species of this genus, the first species, *bridwelli*, being from Mt. Kaala of the Waianae Range.

**Nesithmysus* n. sp.—Mr. E. H. Bryan exhibited a specimen of another species of this newly described genus, which was captured by C. N. Forbes on *Pelea* on the west bank of Haipuaena stream, East Maui, elevation about 3100 feet, June 29th, 1920.

Ticks.—Mr. Bryan exhibited a long series of ticks caught by Mr. Stokes, who said they were infesting his dog's ears in Kaimuki, July 11th, 1920. He reported that the larger ones were slow, sluggish, and deeply imbedded in the flesh, making their removal difficult; the smaller ones were very lively and difficult to catch.

Phora sp.—Mr. Bryan exhibited a series of a species of *Phoridae* which were bred from a bottle of landshells, genus *Auriculella*, collected along Haipuaena stream, East Maui, June 29th, 1920. The bottle had been filled with alcohol, which subsequently leaked out. Whether the maggots lived through the alcoholic period or got in afterward is not known, although the bottle was tightly stoppered and was carried in a cigar box.

Nesotocus giffardi.—Mr. Swezey exhibited two specimens of this large weevil which he had cut out of a *Cheirodendron*

* These two species are described by Dr. Perkins on pages 503, 504 of this issue. (Ed.)

tree on the crest of the ridge where the Wahiawa-Kahana trail crosses the Koolau Range, July 4th, 1920. This is an extension of the range of this species. It had not previously been taken beyond the ridge on the west side of Nuuanu Valley.

SEPTEMBER 2nd, 1920.

The 180th meeting of the Hawaiian Entomological Society was held at the usual place.

Dr. Williams presided; other members present were Messrs. Giffard, Muir, Ehrhorn, Willard, and Fullaway.

Minutes of the previous meeting were read and approved.

Mr. Muir reported on the Scientific Congress in Honolulu.

ENTOMOLOGICAL PROGRAM.

Recent Observations on Plagithmysus Spp. and Nesotocus Munroi at Kilauea Hawaii (Coleoptera).

(With exhibition of specimens)

BY W. M. GIFFARD.

Numerous specimens of *Plagithmysus* and of *Nesotocus munroi* were recently collected by the writer during a short summer visit to some of the forest regions at Kilauea, Hawaii. These regions were all within a radius of approximately two and a half miles of the Volcano House, and included areas in the dry, intermediate, and wet forests. In addition are shown several single specimens taken at large and otherwise on previous visits to Kilauea.

Examples of all but the commonest of these will be sent to Dr. R. C. L. Perkins for final determination of the species so that they may, if possible, be added to our reference collections. The exhibit included the following species:

Plagithmysus darwinianus	attached to	*Sophora chrysophylla.*
" *varians*	"	" *Acacia koa.*
" *bishopi*	"	" *Pelea* sp., also taken running on *Xanthoxylum* sp.
" *vitticollis*	"	" *Perrottetia sandwicensis.*
" *giffardi*	"	" *Suttonia* sp.
" *lamarckianus*	"	" *Pipturus albidus.*
" *bilineatus*	"	" *Metrosideros* sp.
" *perkinsi*	"	" *Myoporum sandwicense.*
" *blackburni* *	"	" *Sophora chrysophylla.*
" *vitticollis* ** var. *longulus*	"	" *Bobea elatior.*

Two very desirable species viz.: *P. sulphurescens* and *P. vicinus*, captured in these forest regions by Dr. Perkins, were not observed and have yet to be re-taken in this and adjacent country. No examples of either of these last-named species are in local collections. *P. sulphurescens* is said to be attached to a species of *Urera*, and *P. vicinus* to a species of *Pelea*.

While the series of *P. vitticollis* exhibited were undoubtedly attached to a *Perrottetia* † when captured, yet this species has been taken before, somewhere in the neighborhood of Kilauea, on akala (*Rubus macraei*), and is so recorded. Further observation of *Rubus hawaiiensis* and *Rubus macraei* should be made by those who search for our native longicorns in and around Kilauea.

At Kilauea, *P. varians*, *P. bilineatus*, and *P. darwinianus* appear to be the most common of all the species in the region, although most of the others are not uncommon when the trees to which they are attached are found to be in the right condition for attack. Heretofore *P. perkinsi*, *P. vitticollis*, *P. giffardi*, and *P. lamarckianus* have been found by the writer to be the least abundant in individuals. No doubt the rare *P. sulphurescens* and *P. vicinus* will be taken in similar numbers

* The series of this species was taken in North Kona. It has not as yet been taken at Kilauea.

** This was taken in the dense wet forest in upper Puna.

† Taken from three trees in dying condition, all near each other.

when the right tree and region is discovered. *P. vitticollis* var. *longulus* so far as learned in previous years from Dr. Perkins, is quite common on *Bobea* in the dense wet forests of Puna. The few visits made by the writer in this particular region have not been very successful in so far as securing a series of that species. This, perhaps, is due to the large clearings which have been made in that forest region by homesteaders and farmers during late years, as well as to the fact that *special* search for longicorns has not been attempted by the writer up to the present time. The forests in the Puna region have, for the reason stated above, receded to such an extent as to make them in a large measure almost inaccessible in a day's outing from the Volcano House.

The fact that *P. blackburni* has not, so far as known, been seen or captured in the neighborhood of Kilauea, but only on the Kona slopes of Mauna Loa, and that it is attached, in the latter region, to the same tree as *P. darwinianus* is at Kilauea, is of interest. Perhaps it may be possible to secure some information as to this, as well as to all the other Kilauea species of *Plagithmysus*, from Dr. Perkins, and also secure from him an example of *sulphurescens* and of *ricinus*, both of which are badly needed in our reference collections. The same may be said of certain species from other islands.

The large series of *Nesotocus munroi* were all taken in the wet forest off *Cheirodendron gaudichaudii* growing in a recently burned area on a new homestead. The two trees observed were in a scorched and dying condition and in perfect condition for these insects, to which they are well known to be attached. A fair series of extraordinary large males were taken on one of the trees, without females, and the males seen in copula on the other trees were all of the ordinary size. The series represents both sexes about equally. The writer has visited scores and scores of *Cheirodendron* trees in the neighborhood of the wet forests at Kilauea during recent years, but he never found these attacked by *Nesotocus* when the tree was in a healthy condition. The same may be said of all trees to which *Plagithmysus* are attached.

Notes on Hawaiian Plagithmysides and Anobiides (Col.) with Descriptions of New Species.*

BY R. C. L. PERKINS.

The following notes have been made on examination of a small, but very interesting collection of Hawaiian Longicorns, submitted to me by Mr. O. H. Swezey, the greater number of the specimens being from the collection of Mr. W. M. Giffard. In most cases the trees from which the species were obtained have been carefully noted, but a considerable number of specimens were taken at large. The numbers attached to Mr. Giffard's captures are here quoted, but the order is not preserved, because the same species is sometimes sent under numbers that are not consecutive, owing to the different circumstances under which the individuals were obtained.

1. A dark specimen of *Plagithmysus blackburni* taken on bastard sandal wood *(Myoporum sandwicense)* on the high plateau (6000 ft) Puulehua, Kona, Hawaii, by J. F. Rock. Mr. Giffard's note says, "It was probably only resting on that tree." This is likely to be correct, as the species is common on Mamani *(Sophora chrysophylla)* in the neighborhood, being attached to that tree, and I have taken specimens on the wing on the plateau. Dark examples occur also on *Sophora* with the paler ones.

16. Three examples of a series taken on Mamani *(Sophora chrysophylla)* at Puuwaawa, N. Kona, Hawaii, are also *P. blackburni* and are quite similar to my own from that locality and from Mauna Loa.

17. Three examples from a series taken on Mamani *(Sophora chrysophylla)* near Kilauea, Hawaii (4000 ft) are rightly named *P. darwinianus,* and three others from a series of twelve (No. 15) taken from a dead tree, which could not be identified, but was not *Sophora*, are also typical specimens of the same. Under (19) are two examples of *darwinianus* from a series of *Plagithmysus* taken on *Xanthoxylum dipetalum*

* This paper by Dr. Perkins (dated Jan. 14, 1921) was received before going to press and is very appropriately included here. (Ed.)

in the above named district (the series consisting of *darwinianus* and *bishopi* mixed) and under (20) four other individuals from another series found on the same species of tree are also *darwinianus*. Whether this series consisted entirely of the latter or partly of *bishopi* I do not know. In July, 1906, I obtained one or two specimens of *darwinianus* on a dying *Xanthoxylum* tree which was full of *Plagithmysus* larvae. The tree was decaying and the bark gave out a strong odor. From material carried away I subsequently bred a series of *P. bishopi*, nine examples of which series I still possess. No specimen of *darwinianus* was bred, and I thought it probable that those I took were merely attracted by the scent, the species being abundant on *Sophora* near by, but Mr. Giffard's experiences lead one to suspect the probability of its breeding both on *Sophora* and *Xanthoxylum*.

14. Three examples of *P. bishopi*, being part of a series taken on *Pelea cinerea* near Kilauea, are quite ordinary, as also are two taken on *Xanthoxylum* from a series of mixed *darwinianus* and *bishopi* referred to above under (19). The series that I bred from the latter tree showed no differences whatever from another series (also bred) from *Pelea*.

13. The larger specimen taken at 1800 ft. Olaa, 19 miles from Hilo, Hawaii, resting on Mamake (*Pipturus albidus*), is a not uncommon variety of *P. lamarckianus*, in which the pubescent lines of the elytra are yellow and very wide basally, so that the insect closely resembles *sulphurescens* in appearance. It is, however, perfectly distinct from this, and *lamarckianus*, so far as I know, always has red antennae in this variety, while in *sulphurescens* they are black. Sharp has specially alluded (F. H. II, p. 111) to the alliance between these species.

13a. The second and smaller example is of the more black-legged variety, but also has flavescent lines of pubescence, and was taken on *Suttonia*—"no doubt an accidental capture"—at 3800 ft., Olaa. The flavescent color of the lines in *lamarckianus* is not a constant character of the species. I have myself bred specimens from the same piece of *Pipturus* both with pure white and with flavescent lines, and no doubt these soon fade to white, so that the latter color is likely to be more usual in

captured examples. In other species (e. g. *vitticollis*) yellow hairs are sometimes substituted for white.

18. Five examples of *P. giffardi* from a very long series obtained on dying *Suttonia* (*Myrsine* of Hillebrand's Flora) agree entirely with those that I obtained at a rather higher elevation and a few miles distant on the same tree. Mr. Giffard's great series, he informs me, exhibits no variation except in the color of the hairs of the hind tibiae, which is usual, and therefore no approach is made to the closely allied *P. sulphurescens*,* which is attached to *Urera*. The species is remarkably constant.

11. Three examples from Olaa, 20 miles from Hilo on the way to Kilauea, being part of a large series collected on dying trees of *Perrottetia sandwicensis*, are typical *P. vitticollis* (except that in one the pubescent spots are yellow) as also is (9), one taken at large in the same locality (8) is a very unusual variety with the femora wholly red and (12) found on a dead *Pipturus* tree, standing near those of *Perrottetia* above mentioned, is a variety with the elytra to a large extent yellowish brown and the antennae, except the apical joints, similarly pale. This example does not differ much from a variety in the original series of *vitticollis*, captured by me on *Rubus* at a considerably higher elevation, and now in the collection at the British Museum.

The original specimens described by Dr. Sharp were all obtained from the native *Rubus*, on the stems of which they were running, and several of them were in copula. Later I took casual examples on the wing or settled on leaves or ferns in the forest about a mile and a half below the volcano along the Hilo road. Frequent search of the native *Rubus* there (imported species were not then evident) failed to yield the beetle and almost certainly those that I caught were stragglers from trees of *Perrottetia*, as Mr. Giffard's observations in the same locality would show.

7. A single specimen taken in Olaa, 19 miles from Hilo, on *Bobea elatior*, is *P. vitticollis* var. *longulus* of the ordinary

* The fig. in Fauna Haw. was, I believe, drawn from a *giffardi* included in the series of *sulphurescens*.

form. This variety was observed by me in great numbers in the same district, as well as in other parts of Puna and in the Hilo district, breeding always in *Bobea,* but in no other tree. No conspicuous variations were observed except that one example had the legs entirely black, and this occurred among numbers of ordinary individuals.

* 5 and 6. Three examples from above Waimea, Kauai, at elevations of 3300, 3500, and 4000 ft., each taken at large, are exactly similar to those taken by myself on Ohia-ha, in which they were observed ovipositing, and with those given me by Mr. G. C. Munro, which are now in the British Museum. Except in size and depth of coloring the species does not seem to vary greatly.

6a. Two examples taken by Mr. H. T. Osborn at Kokee, Kaui, and labeled *P. munroi,* agree with the original specimens. One of these was taken on ohia lehua and probably this is the food plant. As in *P. aequalis* the femora are either black or red.

4. A single example of *P. aequalis* from Kaholuamano, Kauai, is a typical specimen of the red-legged form. It was taken at large, but the species is entirely attached to *Acacia koa,* in the bark of which I have seen very large numbers ovipositing.

3. A single example taken "at large" at Kaholuamano, Kauai, is *P. ignotus,* originally discovered by Mr. G. C. Munro at a considerably lower elevation. Its food plant still remains unknown. The only specimens known have red femora, but whether the species is constant in this, like *concolor,* or variable, like *munroi, aequalis,* and *arachnipes,* remains to be discovered.

These Kauai species bear a very great superficial resemblance to one another, and even the larger *concolor* might in the case of smaller and darker individuals be easily confused in the field, if captured away from its food plant. The following table will distinguish the species on characters, which are visible to the naked eye and can be used by the collector.

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* Exact determinations not given by Dr. Perkins. I suppose he means these to be *P. munroi.* (W. M. Giffard.)

TABLE FOR SEPARATION OF KAUAI PLAGITHMYSUS.

1 (2) Metepisterna with a general clothing of fine white hairs, which do not form one or more very dense, definite, and conspicuous spots, though often more dense at the apex than elsewhere. (Hind femora rufescent, never black; the largest species.) ..... *concolor.*

2 (1) Metepisterna with a very dense and definite tomentose spot at the apex and sometimes one at the base, or else very densely covered over all or nearly all the surface.

3 (4) Hind femora with a very long, pallid (almost white) basal stalk, which is nearly half the length of the whole joint; surface of metepisterna concealed entirely (or almost so) beneath dense short hair or tomentum..... *arachnipes**.

4 (3) Hind femora with the stalk sometimes not thus pallid, or if so, then only about one-third the length of the joint; metepisterna with a dense tomentose spot at the apex and sometimes another at the base, but the middle bare.

5 (8) A single dense tomentose spot on the metepisterna at the apex, the rest bare. (N. B. There may be a spot on the mesopleura also.)

6 (7) Longitudinal stripes on either side of pronotal crest indistinct to the naked eye (the crest itself being covered with minute white hairs); pubescense along the suture of the posterior half of the elytra practically continuous, not forming distinct, separate spots..... *aequalis.*

7 (6) Longitudinal stripes of pronotum quite distinct to the naked eye; pubescence along the suture of the posterior part of the elytra forming distinct separate spots or flecks..... *munroi.*

8 (5) Metepisterna with a dense conspicuous spot in front and another behind (apically).
(Along the suture posteriorly the pubescense is broken up into separate spots, placed in a single row, while the basal part of the elytra is pubescent, but the hairs there are not grouped into well separated distinct spots, as they are in *munroi*) ..... *ignotus.*

The species of the *blackburni* group which occur on Hawaii, being subject to much variation in several cases, can generally

* These characters were taken from females, the only sex before me when the table was written. The female in this species is not like its allies in superficial appearance, but the male resembles them very closely.

be easily distinguished by the characters given in the following table. Very large numbers of all these species have passed through my hands but I cannot remember to have seen any doubtful specimen, although many have borne no indication of the food plant. No doubt extreme aberrations of some of the species may be found, which might not be distinguished by the table. Owing to the great variability in the size of the individuals, so far as possible the characters of different species should be compared in examples of about equal size, where the characters are comparative.

Table for Distinguishing Blackburni Group of Plagithmysus.

1 (10) Pubescent lines of the elytra rarely yellow and wide and in that case the antennae have more than the scape red.

2 (3) Elytra without distinct black or dark fuscous color between the furcation formed by the pubescent lines; antennae black, the scape at most sometimes more or less red.
(Elytra often entirely pale externally to the pubescent lines, more rarely these are margined with black outwardly; hind femora in one common variety conspicuously red on the apical portion, black in the middle, and unlike any other species in this case) ..... *varians.*

3 (2) Elytra distinctly black or very dark colored in the furcation; antennae often wholly or largely red (sometimes dull, dark red) but in extreme cases only the second joint is of this color.

4 (7) Hind femora wholly red, sometimes suffused with black, apically at the sides, but on the upper side the red extends to the apex.

5 (6) Basal joints of the antennae with the black, bristly hairs long, dense and conspicuous; usual food plant *Sophora* ..... *darwinianus.*

6 (5) Basal antennal joints evidently less setose. (When series are placed side by side the present species appears to have the elytra evidently wider at the base than the preceding and its food plant is *Pipturus.*) ..... *lamarckianus ab.*

7 (4) Hind femora either largely or wholly black except the basal stalk, or at least with a considerable portion at the apex entirely black, even on the upper surface.

8 (9) Basal joints of the antennae with dense and very conspicuous bristly black hairs; hind femora normally black (except the basal stalk) and partially red-legged examples infrequent.
(On *Sophora*, Kona side of Hawaii).....*blackburni*.

9 (8) Antennae evidently less strongly setose, examples with largely red hind femora are common, though perhaps more are like typical *blackburni*.
(Pubescent lines of elytra either white or distinctly yellow being variable; food plant *Pipturus*).....*lamarckianus*.

10 (1) Antennae black or practically so throughout, except that in some examples the scape is pitchy or, more rarely, distinctly red; the pubescent lines on the elytra yellow and wide, not or hardly furcate at the base, though the basal edge is emarginate.

11 (12) Elytra yellow or rufescent basally and at the sides.
(Food plant *Urera*.).....*sulphurascens*.

12 (11) Elytra yellow at the sides as far forward as the base of the yellow pubescent marking or somewhat in advance of this, but black above from the base of this marking to the base of the elytra themselves.
(Food plant *Suttonia*.).....*giffardi*.

P. vitticollis is best distinguished from the var. *longulus* by the dense white clothing of the hind tarsi, that of the latter being black, sometimes with a few white hairs mixed, just as the other may have a few black ones. In life, *vitticollis* always appeared to me a brighter insect, owing, I think, to the rather greater development of the yellow pronotal stripes. So far as is known the var. *longulus* never produces varieties with more or less yellow elytra.

The species of *Plagithmysus* which are attached to *Pelea*, whether on Hawaii or other islands, are always distinguishable from the members of the *blackburni* group at the merest glance by the deep velvety black spot in the furcation of the pubescent lines of the elytra, which to my eyes gives them a more pleasing appearance than the others. The following form appears to be either a new species or at least a new race of *P. vicinus* Sh. Originally I possessed a small series of this new form, but having given away specimens under the name *vicinus*, I now have only a pair left. It was found on a species of

Pelea in N. Kona, but in a drier locality and a good many miles from the spot where the typical *vicinus* occurred.

Plagithmysus frater sp. n.

Red, the head above obscure red or reddish black, the face black. Antennae dark red or blackish red. Pronotum entirely red, the median crest appearing more or less darker, and there is a broad, dark, longitudinal band on each side in dorsal aspect, but even here the surface is not black, though darkened. Elytra red, with the usual dark velvety spot in the furcation of the pubescent lines which are subflavescent; beneath the dense black hairs, which form the velvety spot, the surface is red as elsewhere. Legs red, the apices of the femora black, the tarsi with very dense snow-white hairs, the hind tibiae with very dense black hairs, which are directed backwards and not long. Pronotum with the vittae on either side of the crest broad, but very feebly developed or indistinct. The hairs being minute and not very dense, entirely different from the vittae of *bishopi*. Consequently to the naked eye the greater part of the pronotum in dorsal aspect appears greyish on a red surface, the grey color divided by a narrow darker line. Antennae with the setae very dense, black and bristly. The base of the elytra is very densely, rugosely punctured, considerably more so than in several examples of *bishopi*, with which it was directly compared. Size of *bishopi*. Probably closer to *vicinus*, which has a black pronotum and differs in other respects. So far as I can judge without dissecting, the examples are males.

Hab.—N. Kona, Hawaii, about 3000 ft., on *Pelea* sp. Perhaps no more than a local race of *vicinus*. The type is in my collection.

Plagithmysus decorus sp. n.

Black, the femora entirely red (except for the paler basal stalk) as in *P. elegans*, the antennae dark red basally, the more apical joints of a dark fuscous color, the setae on the basal joints not strongly developed.

Pronotum black on about the middle third or more in dorsal aspect, the rest densely covered with minute yellow hairs, the dorsal and lateral vittae of ordinary species having merged into one broad band as in *elegans;* on the sides beneath this band the surface is bare and as densely punctured as possible. Elytra very densely and rugosely punctuate on the basal part, more so than in *vitticollis*, which the species considerably resembles in the pattern of spots, and with this sculpture extending farther back, the white spots along the upturned lateral margin much more developed and almost forming a continuous line. Size probably less than the average of *vitticollis*.

Hab.—Olaa, Hawaii, near Kilauea (29 miles from Hilo) in the forest. The unique example of this beautiful species was taken "at large" by Mr. W. M. Giffard in August, 1913, and is in his collection. This specimen has a slight bare mark in the yellow pronotal bands and this may be due to abrasion, as the hairs of the tibiae and tarsi appear to have been wet. This bare mark is not present in my bred *elegans*. It is No. 10 in the consignment of species.

21. Six examples of *P. aestivus* from Kalamaula, Molokai, taken in April, 1907, I must have seen previously, as I have a note of their occurrence. They differ in no wise from the original examples, the locality lying between the two spots, whence these came, and only a short distance from either. The species is always on *Ohia lehua*.

1. *P. solitarius* female, with the femora thick and well developed for this sex, the specimen collected by Koebele. This species is generally distributed over the Koolau range from the neighborhood of Honolulu to parts above Waialua and Waimea wherever the Ohia ha *(Eugenia)* grows. However, on one occasion specimens were actually bred from the Ohia lehua on Tantalus. In 1900 nearly all the larvae in that locality (though numerous) were parasitized by the two species of *Ischiogonus*, but in February, 1903, a series of the beetle, including black-legged examples, was taken there, and in October, 1906, a single example, flying across the road. I did not attempt to breed any from more distant localities, so do not know whether it was similarly parasitized in these.

A single specimen, not numbered but labeled by myself "*Clytarlus* undescribed sp.," is a female of *P. immundus* Sh., which was bred by me from dead wood brought from Kona, and supposed to be that of the tree *Charpentiera*. It is a most variable species, red, black, or particolored, and has the weak clothing of the hind tibiae and metatarsi characteristic of *Clytarlus*.

Callithmysus.

As recorded by Swezey (Proc. Haw. Ent. Soc. 1919, p. 265), *C. microgaster* var. *hirtipes* was bred by him from *Perrottetia*

and I think I am right in saying that the actual type of that variety was obtained from the same kind of tree, although recorded from *Bobea*. This individual was found resting amongst dead leaves of a broken branch, on a day when it rained heavily and continuously, and collecting was almost impossible. The "on *Bobea*" was added later, when I had become aware that *C. microgaster s. l.* was attached to that tree, having found fragments of the beetle and larvae therein, and was not intended to refer to this particular example, but to the species. Though so infrequently met with alive, the beetle must be quite numerous on occasion, as in 1903, and also on a former occasion, I brought down large numbers of the larvae to Honolulu from different localities, but owing to my absence from home, these nearly all died for want of attention and the few beetles that emerged were dead and in poor condition when I returned. One or two of these that were in moderate condition I sent away, and one or two of the worst I still have. All the larvae were in *Bobea*. Two of those recorded in the Fauna Haw. were taken on the trunks of this tree near Waialua, and are said to differ from the typical form. The late W. H. Ashmead, when collecting with me, captured one on the wing as it flew over a bare ridge in the mountains below the forest. I took one flying on the Tantalus road a little above the house then owned by Mr. Giffard in November, 1906—a small specimen newly emerged, which I still possess, and another in nearly the same locality on another occasion. All these probably belonged to the form with the tibial hairs shorter than the type and the base of the tibiae is not bare to the extent shown in the original figure of the species. If the variety *hirtipes* from *Perrottetia* proves constantly different from these *Bobea* specimens, the case would be similar to that of *P. vitticollis* and its var. *longulus*, which are found on these trees on Hawaii, the most evident difference between the beetles being found in the tarsal hairs. One may suspect that the typical *microgaster* found by Blackburn was attached to some different tree, as the form on *Bobea* seems to occur over most, if not the whole of Oahu. At the same time one must remember that in some *Plagithmysus* there are

very great differences in the hairs of the tibiae and of other parts, as variation or according to sex, and sufficient material of *C. microgaster* for a proper investigation has not yet been secured.

In *Plagithmysus bishopi*, even in examples bred from the same wood, there is variation in the density and arrangement of the hairs of the hind tibiae, and they may be pale or black, even in examples of the same sex. *P. giffardi* notably exhibits dimorphism in these hairs, while some others seem to exhibit neither variational nor sexual differences in these.

The two following species of *Nesithmysus* are very distinct species of this remarkable genus.

Nesithmysus forbesii sp. n.

Black, the head slightly aeneous, the pronotum slightly so in some lights, the elytra very conspicuously metallic, with greenish tint. Head with yellow hairs, not densely clothed. Pronotum on each side about the middle with a strongly prominent angle; the median crest is represented by a strong prominence in front, in lateral view triangular, like a large blunt thorn, on its hind surface rugosely punctate, and a posterior prominence, which in side view is subtruncate and rugosely sculptured on its upper surface; between these and on most of its surface the pronotum is smooth and shining, irregularly and finely punctured, clothed with sparse yellow setae, representing the vittae of *Plagithmysus*. On either side between the posterior median prominence and the lateral angle, and on a line with the former, is another strong prominence, rounded at the apex, and between this and the lateral angle is another broad, but not dense, patch of yellow hairs. The elytra are shining and thinly and irregularly clothed with yellow setae like those on the thorax, but no definite pattern is formed. The sculpture consists of shallow depressions and larger punctures, mixed with finer ones, which are more definite. There is a dense line of yellow hairs extending from the hind coxae to the patch covering the ends of the metepisterna; on either side of the ventral segments 1-3 at the apex is a distinct spot of these hairs; the 5th ventral segment is conspicuously excised in the middle. The specimen is no doubt a female, the antennae short, about three-quarters of the length of the elytra, the 10th joint not twice as long as wide. Length about 20 mm.

Hab.—East Maui, Haipuaena, 3100 ft. A single example from *Pelea* on June 29th, 1920 (*C. N. Forbes*).

Nesithmysus haasii sp. n.

Black, scape of the antennae to a large extent, as also the small 2nd joint, the next two basally and the others on one side at least, though very obscurely, red or reddish. The trochanters, basal part of femora, tibiae for the most part, and basal portion of first tarsal joint also red. Face for the most part densely clothed with yellow hairs, the top of the head rather less densely. Pronotum with the median crest greatly raised in front, less strongly behind, coarsely rugosely sculptured, the anterior prominence bluntly triangular in lateral aspect, the hinder one curved, the prominences on either side of this strong and blunt, the lateral angles near the middle of the length of the pronotum obtuse and not strongly prominent, much less so than in the preceding species. The yellow vittae on either side of the median crest are conspicuous, widely separated, and irregular in width and are connected with the outer ones broadly in front and narrowly behind; these latter occupy all the flanks of the pronotum downwards from their origin except that the prominent lateral angles form a smooth glabrous area amongst the yellow hairs. The metepisterna have a dense yellow patch of hair posteriorly and there is another anterior to this on the mesopleurae. The elytra are about five times the length of the pronotum, very densely, finely and distinctly punctured all over, a yellow line on each just within the suture from apex to base, continued across the deflexed basal surface to near the shoulders and then continued backwards as a second longitudinal oblique line, which adjoins the sutural one at about the middle of the length of the elytra. Along the upturned lateral margin of these is a dense narrow line of similar yellow hairs extending from base to apex. The first four ventral segments of the hind-body have a pair of distinct yellow spots apically, the 5th is simply rounded or slightly truncate at the apex and not at all emarginate. Length about 25 mm. Female.

In the unique specimen described the yellow pubescent lines are in parts interrupted owing to abrasion, but are here described as if they were entire. The longitudinal ridges of the elytra, similar to those in some *Plagithmysus*, in which they often vary in individuals, are very definite in this specimen, the inner ones reaching behind the middle, the outer ones still further.

Hab.—Oahu, Wahiawa *(Chas. Haas)*. A single example in the collection of Mr. O. H. Swezey.

In the thick forest behind Waialua, twenty years ago, large exit holes of a Longicorn supposed to be *Plagithmysus* were found in some of the big *Pelea* trees growing there. Very

few were seen and no beetle was obtained, but it is possible that they may have been made by this large *Nesithmysus*. The heavy hind body and more cylindrical form of *Nesithmysus* have deprived the genus of the elegant shape of *Plagithmysus*, and one could imagine the insects to be much less active than the latter.

Anobiides.

The Anobiid here described belongs to the very difficult genus *Xyletobius* in a wide sense, but the many species described by me are in my opinion not always congeneric and the present species is an abnormal one and unlike any known to me.

Xyletobius timberlakei sp. n.

Dark fuscous, the pronotum at the sides and posteriorly (and sometimes entirely excepting the disc) the apex, sides (more or less) and the basal margin of the elytra evidently red. The antennae, under side of the whole thorax, the coxae, femora and tarsi also red or reddish testaceous, the tibiae and abdomen darker, mostly dark fuscous.

Remarkable for its long cylindrical form as compared with most species. Eyes very large, in a front view of the face these together are fully as wide or wider than the space between them. The antennae are very long, the small second joint distinctly angulate beneath or with the lower apical angle a little produced in some aspects, third triangular and hardly as long as its greatest width, fourth, fifth and sixth increasing in length and becoming more slender, distinctly emarginate at the apex, seventh strongly elongate and evidently less wide than the sixth, the apical joints are wanting, except in one case where the antennae lies beneath the body, and in this the tenth joint appears to be more than twice as long as wide. Pronotum at the sides very widely explanate or flattened (at the hind margin the flattened parts are together as wide as the space between them) perceptibly emarginate in the middle, anteriorly, finely but distinctly margined both in front and behind, distinctly emarginate on each side between the hind angles, which are rounded, and the middle. Seen from above the pronotum has a distinct pattern formed of golden tomentum in the middle and other spots or marks external to this on each side. The elytra are fully three and a half times the length of the pronotum, and are notably compressed at the sides, so that a great subtriangular area appears bare on each wing case, the apex of each triangle coming rather near to but not reaching the suture at about the middle of the length of the elytra. From each apex an oblique

more or less broken line, of pale tomentum runs towards the side of the elytra behind the shoulders, defining more clearly one side of the triangles, which is in reality a feeble ridge, formed where the lateral compression meets the basal part of the wing cases. The second and third striae (the first being as usual abbreviate) unite at the apex, the fourth and fifth do so also, but do not extend so far back as the inner ones. In lateral view of the elytra the punctures in the outer striae are easily seen. Length 5.5 mm.

Hab.—Hawaii, Kealakekua, 3500 ft. *(Timberlake).* One on *Clermontia caerulea* and one on *Byronia sandwicensis.*

Holcobius hawaiiensis Perkins.

This species was originally described from a single example taken in the stem of a tree fern in Kona, Hawaii, and in the "Fauna" I referred to it others, taken later at Kilauea, also on tree ferns. The Kona example is smaller than the others and has dark antennae, but in the allied Maui species these organs showed some variation in color (Fauna Hawaiiensis III, 583). Mr. Giffard has taken five examples in his house at light, close to the spot where I found it near Kilauea. These agree well with mine and differ from the allied *H. haleakalae* in being evidently more robust and in the point of sculpture mentioned in the description of the original example from Kona. The length of the Kilauea specimens averages 9 mm., and this form may be called var. *vulcanus.* These large species of *Holcobius* seem to be almost entirely nocturnal and difficult to collect by day. By night those which have burrows in dead trees come out and sit on the bark, and may be found paired in some numbers, as I experienced in a thick forest on Haleakala. The dead trees that they frequented, mostly Ohia lehua, were unfortunately a considerable distance from my tent and I found such difficulty in regaining this by the light of a lantern that I had to give up this method of collecting the beetles. *Holcobius affinis, granulatus* and *glabricollis* as well as *hawaiiensis* have all been taken attracted by light.

OCTOBER 7th, 1920.

The 181st meeting of the Hawaiian Entomological Society was held at the usual place. Present: Crawford, presiding; Swezey, Mant, Giffard, Timberlake, Muir, Whitney, Ehrhorn, and Fullaway.

The minutes of the 178th and 180th meetings were read and approved.

ENTOMOLOGICAL PROGRAM.

New Hawaiian Delphacidae (Homoptera).

BY F. MUIR.

The present paper deals with part of the collections made by Mr. W. M. Giffard and not dealt with in my last paper,* and with collections made by Messrs. Timberlake and Giffard in 1919, also with a few other species. They add eleven new species and one variety to our list, as well as new localities. A number of species in the collections are not mentioned as they are not new. That such a well worked locality as Castle trail, Oahu, should yield new species indicates that we are far from the end of our list of species. While it is hoped that the recently introduced Miridae, *Cyrtorhinus mundulus* (Bred.), will be of benefit in the cane field and reduce the number of *Perkinsiella saccharicida* Kirk., it is to be hoped that it will not take to the native forest and interfere with the native Delphacidae.

The genus *Ilburnia* White now stands as the second largest genus in the family with eighty species; *Delphacodes* Fieb. *(Liburnia)* being the largest with about 180 species.

With the increase in the number of species some of them are becoming more difficult to define, even by the genitalia; at the same time isolated forms such as *I. sulcata* are turning

* Proc. Haw. Ent. Soc. IV. 1. (1919) p. 81.

up. The intermediate forms will give us a better idea as to the line of evolution.

The varieties of such species as *Aloha ipomœae, Ilburnia blackburni* and *I. ipomœicola* attached to different food plants, require special study, and experiments of change of food and cross breeding should be carried out.

The cause of the variation of the male genitalia is the fundamental problem of the evolution of these insects. How many genetic characters the ædeagus contains is difficult to estimate. It is also difficult to understand why the genitalia should be the organs chiefly affected by crossings if Lotsy's theory be maintained.

Weismann and his followers have overemphasized the difference between the germ and somatic cells. There is but one cell and that is the germ cell. The somatic cells being only differentiated germ cells and the differentiation apparently lies wholly within the cytoplasm. Although the chromosomes may be the "bearers of heredity," yet they do not enter into the formation of the "characters." At most they only act upon the cytoplasm.

If cell division be quantitative (as polyembryony indicates) and not qualitative, how do similar nuclei acting upon similar cytoplasm bring about various differentiations? The nucleus cannot be the sole causation of the differentiation of the cytoplasm unless we admit a selective and qualitative division of the chromosomes.

There is experimental evidence to show that the relative position of the cell in the early stages of the embryo influences its development quite irrespective of the nucleus. The influence of certain cells, or their secretions, upon the growth and development of other cells in an organism has been demonstrated by experiments. Among Delphacidae there is a corelation between the germ plasm and the external male genitalia, as is indicated by the effect upon the latter brought about by injury to the former by parasites. It is therefore thinkable that an alteration in the germ plasm could bring about an alteration in the male genitalia without any special change in any particular chromosome or chromomere. It is only along

these lines that I can at present understand the specific differences of the genitalia.

The types of the new species have been deposited in the collection of the Hawaiian Sugar Planters' Experiment Station. Measurements are from the apex of the vertex to the anus and from base to apex of one tegmen.

DELPHACINI.

Kelisia swezeyi Kirk.

A small series on *Eragrostis* from Olokele Canyon, Kauai (*Swezey*, Sept., 1920).

Kelisia sporobolicola Kirk.

A male and a female on *Eragrostis* from Puu Ka Pele, Kauai, elevation 3500 feet, and a series of both sexes from Mana, Kauai, on *Sporobolus* (*Swezey*, Sept., 1920).

There is another series from Haleakala, Maui, elevation 6200 feet, on *Eragrostis* (*Timberlake*, July, 1919) which is lighter in color than the typical and the granules smaller but quite distinct.

Kelisia sporobolicola immaculata var. n.

In the typical *K. sporobolicola* Kirk. the granules on the veins are black. In this variety they are the same color as the veins so the tegmina are not spotted. The genitalia are similar.

A series from a steam crack, Kilauea, Hawaii, elevation 3800 feet, on *Deschampsia australis*. Another series on the same plant in the same district, elevation 4000 feet (*Giffard*, Aug., Sept., 1919). In coloration this variety is very like *K. swezeyi*, but the genitalia is that of *K. sporobolicola*.

ACOHINI.

Leialoha lehuae mauiensis Muir.

A small series from Keanae Pali, Haleakala, Maui, elevation about 5000 feet, on *Ohia lehua* (*Timberlake*, July, 1919).

Nesodryas (Nesothoe) haa sp. n. Fig. 1.

Male. Macropterous; length 2.5 mm. tegmen 3.6 mm.

Opening of pygofer subdiamond shape, anal angle fairly well pro-

duced; genital styles with apical, curved portion small; anal spines strong, slightly curved; aedeagus long, thin, tubular, slightly curved on basal half, apex produced into a crescent, one horn of which is small and truncate at apex.

Light chestnut, lighter over the carinae of pronotum and vertex; apical portion of face and genae white or light yellow, two transverse, white bars on middle of face and a smaller one near base, none of them reaching the lateral margins; four or five white spots along tempora; first joint of antennae and basal part of second dark; femora dark, tibiae and hind tarsi banded dark and light; abdomen light over pleura and hind margins of sternites, on edge of pygofer opening and genital styles. Tegmina chestnut, a large hyaline arc-shaped patch covering apex of costal cell and apical radial cells, also hyaline in apical portion of 3, 5, and 6 apical cells; the brown over the apical half darker and fuscous, light marks in clavus with a dark mark at apex; granules small, bearing brown macrotrichia.

Female. Macropterous; similar to male. Length 3.4 mm; tegmen 4 mm.

The genitalia of this species are near to *N. dryope* and *N. munroi* but they are quite distinct from both. Described from nine males and twelve females from 29 miles, Olaa, Hawaii, elevation 2300 feet, feeding on *Antidesma platyphyllum,* the native name of which is haa (*Giffard*, Aug., 1918, Jan., 1919). Also 9 males and 5 females from 23 miles, Olaa, Hawaii, on the same food plant (Giffard, Aug., Sept., 1919). These were all taken in company of *N. dryope.*

Aloha myoporicola Kirk. Fig. 8.

The figure of the genitalia of this species given elsewhere * was drawn from a distorted specimen. I now give a more correct figure.

Ilburnia dubautiae sp. n. Fig. 10.

Male. Brachypterous; length 2.5 mm., tegmen 1.8 mm.; length of vertex 1.3 times the width, apex wider than base, slightly rounded, base about middle of eyes; length of face twice the width, sides slightly arcuate, median carina simple; antennae reaching middle of clypeus, second joint 1.8 times the length of first; tegmina reaching to apex of pygofer; hind femora reaching to end of abdomen, first hind tarsus longer than the other two together.

Opening of pygofer similar to *I. nigroceps* (Muir), the anal spines much smaller but diverging as in that species. The aedeagus has a

* Proc. Haw. Ent. Soc. III (1916) p. 217. Pl. 2. fig. 18.

row of six teeth on a dorso-lateral position, the ventral spines do not proceed to the left side as in *I. nigroceps* and there are more spines on the right side at the apex of the ventral row. The genital styles are like those of *I. nigroceps*. Head, antennae, legs, abdominal pleura, and middle of tergites light brown or yellow; face, vertex, and genae dark brown between carinae; pronotum, mesonotum, front and middle coxae, abdominal sternites, lateral portions of tergites, pygofer, and apices of tarsi dark brown. Tegmina hyaline, light yellow, veins same color, granules minute, sparse, bearing black macrotrichia, a small brown spot at apex of clavus and a minute one at apex of costal cell.

Female. Brachypterous; length 3.6 mm.; tegmen 2.5 mm. Hind femora not reaching to apex of abdomen; tegmina reaching to apex of seventh abdominal tergite. Uniformly light brown or yellow, the spot at the apex of costal cell slightly larger than in the male.

Ridge south of Iao valley, Maui, elevation 2000 feet, on *Dubautia plantaginea* (*Timberlake*, July, 1919).

This is a Maui representative of *I. nigroceps* of Lanai; the lighter color of both sexes as well as the difference of aedeagus and anal spines makes them easy to separate. A figure of the aedeagus of *I. nigroceps* is given for comparison. Fig. 7.

Ilburnia nesopele sp. n. Fig. 6, a.

Male. Brachypterous; length 2.4 mm., tegmen 1.6 mm.; length of vertex 1.3 times the width, sides parallel, apex slightly curved, subequal to base in width, base slightly anterior to middle of eyes; length of face twice the width broadest on apical half, carinae obscure, median carina simple slightly thickened at base; antennae reaching to middle of clypeus, second joint 1.8 times the length of first; tegmina reaching to eighth tergite; hind femora reaching slightly beyond apex of abdomen, hind tarsi nearly as long as tibia, first tarsus slightly longer than other two together. Opening of pygofer slightly longer than wide, margins entire, a slight prominence on medio-ventral edge, dorsal emargination wide, shallow, not embracing more than half the anal segment; armature on diaphragm shield-shape, prominent, ridged down the middle, the sides strongly shagreen; anal spines large, flat, narrow, bases contiguous, slightly diverging at apex; genital styles reaching two-thirds to anal segment, broad, flat, broadest on basal half, apex truncate with angles projecting, the outer one more so than the inner; aedeagus near to that of *I. pele* (Kirk.) but the base larger and the spines on the dorsal aspect continued on to the right side to near base, the ventral spines forming a single row.

Dark brown; vertex, carinae of face and clypeus, antennae, femora, tibiae and tarsi of front and middle legs, tibiae and tarsi of hind legs, and basal portion of abdomen light brown or yellow. Tegmina hyaline, slightly fuscous, veins slightly darker, a small dark mark at

apex of subcostal cell and a larger one at apex of clavus from which it spreads out towards the middle and base, granules minute, sparse, bearing black macrotrichia.

Female. Brachypterous; length 3 mm.; tegmen 2.1 mm.; hind femora not reaching to apex of abdomen. Much lighter in color than the male; light brown or yellow, dark between carinae of face, genae, clypeus, last joint of tarsi and hind femora. Tegmina hyaline, a dark mark at apex of subcostal cell and apex of clavus.

Ukulele pipe line, Haleakala, Maui, 5000 feet elevation, on *Astelia veratroides* (*Timberlake*, July, 1919). The nymphs are yellow, brown on face, clypeus, wing pads, hind femora, and apical tarsi.

Described from seven males, three females, and three nymphs. This small series shows some color variation in the usual direction of the reduction of the dark areas. This species comes near to both *I. pele* (Kirk.) and *I. raillardicola* Muir. From the former it can be easily separated by the shape of the base of the aedeagus and the spines along the right side; from the latter it is easily separated by the long anal spines. Figs. 9a and 5.

Ilburnia amamau sp. n. Fig. 19, a.

Male. Brachypterous; length 2.9 mm.; tegmen 2 mm. Vertex slightly broader than long, apex slightly rounded, the two median carinae projecting, base slightly before middle of eyes, length of face twice the width, narrowest on basal half, median carina forking near base; antennae reaching beyond base of clypeus, second joint 1.6 times the length of first; hind femora reaching to apex of abdomen, first tarsus slightly longer than other two together; tegmina reaching base of pygofer.

Opening of pygofer longer than wide, anal emargination shallow, margins entire, a small projection from the medio-ventral edge; anal spines large, acute, slightly curved, not contiguous at base; genital styles narrow, flat, produced on inner basal edge, apex truncate with inner angle projecting; aedeagus flattened laterally, in lateral view deep with a deep emargination in middle of ventral edge, base narrowed, functional orifice near apex, three small spines on right near upper angle and a cluster of them on ventral aspect near apex which continues onto left side.

Light brown, fuscous between carinae of face, genae and clypeus and over carinae of thorax; darker over abdominal sternites and lateral portion of tergites. Tegmina hyaline, light brown, veins slightly darker, granules minute, sparse, bearing black macrotrichia.

Female. Brachypterous; length 3.5 mm.; tegmen 2.4 mm. Tegmen reaching to apex of eighth tergite. Similar in color to the male.

Haleakala, Maui, elevation 6100 feet (*Timberlake*, July, 1919). Described from forty males and one hundred and thirteen females and some young, taken on *Sadleria*, the native name of which is Amamau. The nymphs are uniformly light brown. There is the usual tendency for some specimens to be lighter than others and for the females to be lighter than the males. This species comes next to *I. painiu* Muir, to which it is closely related.

Ilburnia aku sp. n. Fig. 14, a.

Male. Brachypterous; length 2.5 mm.; tegmen 1.8 mm. Vertex considerably longer than wide, apex slightly rounded, the same width as base, base about the middle of eyes; length of face 2.6 times the width, slightly narrower at base than at apex, median carina simple; antennae reaching beyond base of clypeus, second joint 1.8 times the length of first; hind femora reaching to apex of abdomen, tibiae longer than femora, first joint of hind tarsus slightly longer than the other two together, spur with eight teeth; tegmina reaching slightly beyond the apex of abdomen.

Opening of pygofer large, the ventral edge somewhat straight, anal angles produced and curved inward; anal spines well developed, situated toward the base of the anal segment, their bases touching, slightly curved and diverging; the armature of the diaphragm oval, shiny; genital styles flat, slightly wider on basal half, apex truncate, sides subparallel; aedeagus tubular, slightly flattened laterally, orifice at apex which is slightly enlarged, a small row of minute spines on ventral aspect at apex and another on the right side of apex.

Dark brown; antennae, carinae of head, metathorax, legs, and base of abdomen yellowish, pleura and seventh and eighth tergites light. Tegmina hyaline, yellowish, with a dark brown mark from apex of costal cell to apex of clavus, more or less fading out in the middle. There is a tendency in some specimens for the carinae of thorax to be light.

Female. Brachypterous; length 2.7 mm.; tegmen 1.8 mm. Similar to male, but hind femora not reaching to apex of abdomen.

Olaa, 23 miles, Hawaii, elevation 2300 feet, feeding on *Cyanea tritomantha* (native name Aku). Described from eleven males and three females (*Giffard*, January, 1919).

This species is fairly isolated. At present I would place it near to *I. blackburni*. It is possible that it comes near to *I.*

procellaris (Kirk.) but I have not seen the aedeagus of this species.

Ilburnia blackburni (Muir).

A series of both sexes and young on *Clermontia coerulea* Hbd., Kona, Hawaii (*Timberlake*, August, 1919). A long series of both sexes and young from 29 miles, Olaa, Hawaii, feeding on *Urera sandwicensis* Wedd. (*Giffard*, August, 1918). One macropterous male from Crater Road, Kilauea, and one macropterous female from 23 miles, Olaa, Hawaii (*Giffard*, September, 1919).

Ilburnia waikamoiensis (Muir). Fig. 2.

A series of both sexes and young on a species of *Cyanea*, Haleakala, near Puu-o-luau, Maui, elevation 5800 feet (*Timberlake*, July, 1919). The former figure of the aedeagus of this species * is reversed. It is slightly concave ventrally; the spines on the right side are small and form a row near the ventral aspect, those on the left are larger and towards the apex run on to the dorsal surface.

Ilburnia boehmeriae sp. n. Fig. 12, a.

In general build and coloration this species is similar to *I. pipturi* (Kirk.), but there is a difference in the genitalia which is visible externally. The genital styles are much narrower in the middle and the inner apical corner considerably produced; the aedeagus is more curved on the apical third, the basal projection is much smaller and narrower at base and the spines on the right side fewer and form a line; the anal spines are stouter.

Length of male 2 mm.; tegmen 1.2 mm.; female 2 mm.; tegmen 1.3 mm.

Makaleha Valley, Oahu, on *Boehmeria* sp. (*Swezey*, August, 1919). Described from five males, one female, and one young, the latter being uniformly yellow.

This is a case of a different food plant being associated with a small but distinct difference of the genitalia while the external body characters and coloration is apparently the same.

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* Proc. Haw. Ent. Soc. IV. 1. (1919) p. 105. Fig. 8.

The aedeagus and right genital style of *I. pipturi* are figured (Figs. 11, 11a) at the same magnification as those of *I. bochmeriae*.

Ilburnia chambersi (Kirk.).

A small series on *Raillardia ciliolata* from Crater Road, Kilauea, Hawaii (*Giffard*, July, 1919).

Ilburnia geranii sp. n. Fig. 13, a.

Male. Brachypterous; length 2.2 mm., tegmen 1.7 mm. Vertex nearly as broad as long, apex slightly rounded, base considerably before the middle of eyes; length of face 2.2 times the width, sides slightly curved, broadest in middle, median carina simple; antennae reaching to base of clypeus, second joint twice the length of first, tegmina reaching to apex of abdomen; hind femora reaching slightly beyond apex of abdomen; tarsi subequal in length to tibiae, first hind tarsus as long as the other two together.

Opening of pygofer round, edges entire, dorsal emargination shallow exposing anal tube, anal spines small, stout; genital styles fairly short, flat, narrowest in middle, apex truncate with inner angle slightly produced; aedeagus tubular with a dorsal projection at the base, apex acute with orifice along ventral aspect of apex, a ring of eight or nine spines about one-third from apex, a comb of five spines on the ventral aspect just basad of the ring of spines; the armature on diaphragm forming a raised knob with shagreen surface.

Light brown; dark brown or black between carinae of face, gulae and clypeus, on lateral portion of pronotum, over carinae of mesonotum, on front and middle coxae, abdominal sternites and mediolateral portion of tergites. Tegmina hyaline, a broad, irregular, fuscous band from apex of costal cell to apex of clavus extending in middle down to junction of media and cubitus, granules sparse, small, black, bearing short, black macrotrichia.

There is the usual amount of color variation, in some specimens the dark fades out considerably.

Female. Brachypterous; length 2.7 mm., tegmen 1.7 mm.; tegmina reaching to apex of seventh tergite. In coloration lighter than the male, some specimens being nearly uniformly light brown.

Haleakala, Maui, 6000 feet elevation, on *Geranium arborium* (*Timberlake*, July, 1919). The young are light brown with dark brown at base of tegminal pads and sides of abdominal tergites. Described from eighteen males, sixteen females and a number of young. This species comes next to *I. acuta* Muir, but the aedeagus is easily distinguished by the large comb of five teeth on the middle of ventral aspect.

Ilburnia sulcata sp. n. Fig. 4.

Male. Brachypterous; length 2.5 mm., tegmen 1.5 mm. Length of vertex 1.4 times the width, apex slightly rounded with median carina projecting in middle, base well behind the middle of eyes; length of face 2.3 times the width, slightly widest at apex, median carina simple but base wide, showing trace of fork; antennae reaching beyond the middle of clypeus, second joint 1.5 times the length of first; tegmina reaching middle of sixth abdominal tergite; hind femora projecting slightly beyond apex of abdomen, first tarsus longer than the other two together.

Opening of pygofer about as long as wide, margins entire, dorsal emargination shallow, not embracing more than half the anal segment; anal spines large, flattened laterally, strongly curved outward, apices acute; genital styles long, narrow, flat, outer margin slightly concave, inner margin produced on basal third, apex truncate with the angles slightly projecting, a slight ridge in middle near inner edge; aedeagus large, flattened laterally, apex curved ventrad, a deep, longitudinal sulcus along the dorsal surface from base to the curve near apex, three rows of broad, flattened spines surround the apex at the point where sulcus ends, three or four shorter rows basad of these, functional orifice at apex.

Antimony yellow; a fuscous streak between the carinae of face, clypeus and genae, a longitudinal, faint fuscous mark on femora, darker on hind pair, faintly fuscous between carinae of nota. Tegmina hyaline, light yellow, a black mark at apex of costal cell and another at apex of clavus, veins slightly darkened, subcosta more so, basal margin of clavus black, granules minute and sparse, bearing black macrotrichia.

Female. Brachypterous; length 2.7 mm., tegmen 1.6 mm. Hind femora not reaching apex of abdomen; tegmina reaching seventh abdominal segment. Young uniformly yellow.

Ditch trail east of Keanae, Maui, elevation about 1500 feet, on *Cyrtandra* sp. (*Timberlake*, July, 1919). Described from two males, five females, and one young. The genitalia of this species isolates it from all others. For the present I place it next to *I. mauiensis*.

Ilburnia coprosmicola Muir.

A series of both sexes and young from Kau desert, Kilauea, Hawaii, elevation 3800 feet, on *Coprosma ernodioides*. There is little difference in color compared with the type specimens from 29 miles, Olaa, in spite of the difference in climatic conditions.

Ilburnia raillardiae (Kirk.). Fig. 18.

A long series of both sexes and young on *Raillardia scabra*

from 25 miles, Olaa, Hawaii, elevation 2300 feet. A small series on *Raillardia ciliolata* from the a-a flows, Kau desert, Hawaii, 3800 feet elevation (*Giffard*, June, July, 1918).

Ilburnia neoraillardiae sp. n. Fig. 17.

Male. Brachypterous; length 2 mm., tegmen 1.4 mm. The external characters of this species are similar to those of *I. raillardiae* (Kirk.). In the genitalia the aedeagus is proportionally longer and not so deep, the genital styles are not so long at the apical outer angle and the inner edge is not so concave. The species are very closely allied.

Buckthorn brown or ochraceous tawny, lighter at base of abdomen and darker on abdominal dorsum; apex of genital styles dark. Tegmina light tawny, veins obscure, granules very minute bearing small, black macrotrichia.

Female. Brachypterous. Similar to male. Length 2.4 mm.; tegmen 1.9 mm. Macropterous. Length 2.7 mm.; tegmen 3.0 mm.

Described from forty-seven males and thirty-six females from Kahuku, Kau, Hawaii, elevation 1800 feet, feeding on *Lipochaeta subcordata* (*Giffard*).

Ilburnia ipomoeicola (Kirk).

A long series of males, females and young from Kahuku, Kau, Hawaii, elevation 1800 feet, on *Ipomoea* sp., in which are represented the light and dark forms and also intermediate. (*Giffard*, July, 1918). Four males and seven females and young from Lower Puna, Hawaii, elevation 30 feet, on *Mucuna gigantea* (*Giffard*, August, 1918). There are dark forms tending towards the intermediate.

Ilburnia gigantea sp. n. Fig. 15.

Male. Brachypterous; length 4.5 mm., tegmen 2.5 mm. Length of vertex nearly double (1.8 to 1) the width at base, projecting considerably beyond the eyes, apex slightly broader than the base, the carinae form a broad projection in the middle of the apex, base at middle of eyes; length of face 2.7 times the width, sides slightly arcuate, widest in middle, the furcation of median carina forming a thickened ridge on basal third; antennae reaching to the middle of elypeus, second joint 1.6 times the length of first; femora not reaching to apex of abdomen, tibiae longer than femora, first tarsus longer than the other two together, spur with ten teeth.

Brown; carinae of head and thorax lighter, antennae and legs mottled light and dark, light over abdominal pleura and in middle of tergites. Tegmina hyaline, yellowish, black over veins except the apical, a dark mark at apex of clavus and at apex of costal cell.

The shape of the pygofer is similar to that of *I. koebelei* (Muir),* anal spines small, bases wide apart; genital styles flat, broadest on basal two-thirds, apical third narrowed to pointed apex; aedeagus slightly flattened laterally, curved, orifice large situated on dorso-apical half, a row of small, curved spines on ventral aspect one-third from apex bending to left side, a few scattered spines on sides of apical half; armature on diaphragm consisting of two small, curved processes flattened laterally.

Castle trail, Oahu, elevation about 2000 feet, taken on *Pritchardia* sp. (*Swezey*, August, 1920). As only a single specimen was taken this may not be its food plant. The species comes near to *I. koebelei* (Muir). It is of interest as showing the line by which a more normal type, such as *I. neowailupensis* (Muir) can proceed to such a form as *I. halia* (Kirk.).

* Proc. Haw. Ent. Soc., III, 4 (1917). Pl. V, fig. 10.

PLATE VIII.

LIST OF FIGURES.

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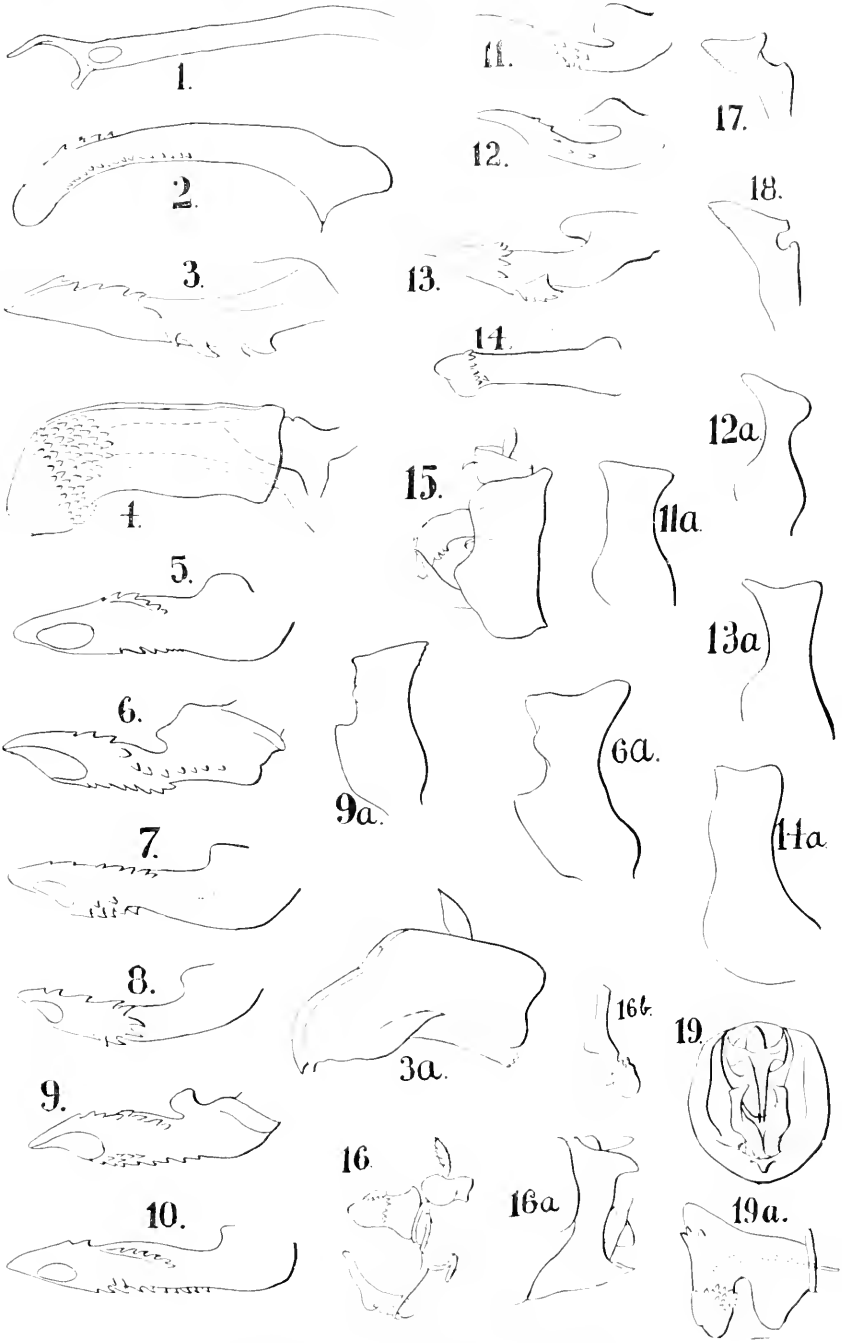


Genitalia of new Hawaiian Delphacids.

Ilburnia olympica sp. n. Fig. 16, a, b.

Male. Brachypterous; length 3.3 mm., tegmen 2.4 mm. Length of vertex 1.7 times the width, base slightly behind the middle of eyes, slightly narrower than apex, the carinae projecting well forward in middle of apex; length of face 2.7 times the width, slightly broadest on apical half, forking of median carina near the apex, but they do not form two distinctly separate carinae, but a broad, flat ridge narrowing towards the apex; antennae reaching near to the middle of clypeus, second joint 1.4 times the length of first; hind femora reaching a little yeyond the apex of abdomen, tibiae longer than femora, first hind tarsus considerably longer than the other two together, spur with nine or ten teeth. Opening of pygofer broader than long, anal angles produced and curved nearly enclosing the anal segment, medio-ventral edge produced into a pointed process; anal segment without spines; genital styles flat, broadest at base, narrowest in middle, apex truncate, slightly oblique; aedeagus short, slightly compressed laterally, deep, more so at base, the orifice large, occupying the apical half of the dorsal aspect, the edge set with several small spines, a circle of small spines slightly apical of middle.

Vertex and face dark shiny chestnut, clypeus lighter with darker marks between carinae; antennae fuscous, thorax fuscous, lighter between carinae, legs fuscous, abdomen fuscous lighter at base. Tegmina light brown or yellowish, veins black, a black mark at apex of clavus and a smaller one at apex of costal cell, granules small bearing black macrotrichia.

Female. Brachypterous; length 2.7 mm., tegmen 1.9 mm. Much lighter in color than the male.

Castle trail, Oahu, elevation about 2000 feet, on *Lobelia* sp. (*Swezey*, August, 1920). Described from three males and one female. This species is very isolated; it might equally well be placed near *I. halia* or *I. asteliae*.

Ilburnia lobeliae (Muir). Fig. 3, a.

The genitalia has not been previously figured.

Kauai Insect Notes and Records.

BY O. H. SWEZEY.

While on the Island of Kauai during the first week of September, 1920, I was able to collect insects in a few places where I had never been before, but the great amount of rain prevailing at the time prevented collecting more than for about three days altogether. Some interesting captures were made of native insects, and several immigrant insects were found for the first time on that island.

First Records of Immigrants for Kauai.

Allograpta obliqua (Say).—Two specimens of this Syrphid fly were caught in Olokele Canyon at about 1400 feet elevation. I did not see it anywhere else on the island. This is the aphis-feeding Syrphid that was first noticed in Honolulu the first part of this year.

Bruchus pruininus Horn.—The Bruchid which attacks the seeds of *Lucaena glauca*. I collected several specimens of the weevil on the flowers of its host tree in Olokele Canyon at an elevation of 1400 feet.

Bruchus obtectus Say.—The common bean weevil was obtained in a store at Waimea.

Diachus auratus (Fab.).—This Chrysomelid, first recorded in Honolulu in 1913, I collected in Olokele Canyon (1400 feet) and at Puu Ka Pele (3500 feet).

Hyperaspis jocosa (Muls.).—The ladybeetle introduced from Mexico to prey on the lantana *Orthezia*, I collected at Puu Ka Pele and at Summit Camp.

Chrysidid.—The Chrysidid which has been known in Honolulu since 1914, I saw one specimen of on a fence at Lihue, but failed to collect it.

Epyris extraneus Bridwell.—I collected this Bethylid among morning glory vines on a stone wall at Lihue. Mr. Osborn tells me that he has seen this parasite on Kauai previously but had not recorded it.

Dolichurus stantoni Ashmead.—I collected this Philippine roach parasite at Lihue and at Waimea at the edge of cane fields. This was first liberated in Makiki Valley near Honolulu in 1917. No attempt was ever made to spread it, but it has already reached Kauai and become widely dispersed there, for the two places mentioned are thirty miles apart.

Megachile timberlakei Ckll.—I collected this bee in company with *M. palmarum* Perkins at Waimea.

Pison argentatum Ashm.—This wasp was collected in company with *P. iridipennis* at Waimea.

Dendryphantes sp.—This is a jumping spider first found in Honolulu about 1911. It is distinguished by the male having red on the back. I found it in a number of places on the lowlands of Kauai.

Other Records of Interest.

Atractomorpha crenaticeps Blanch.—This grasshopper was found on Kauai for the first time in 1917, at Makaweli. I now found it at Puu Ka Pele (3500 feet) and at Lihue (1000 feet).

Monocrepidius exsul Sharp.—This Elaterid, whose predacious larvae have lately become a pest in cane fields in the Hamakua district of Hawaii, I collected abundantly at lights at Waimea. I also found it wherever I went in various parts of the island.

Orthodera prasina Burm.—This little Mantid, known only at Kilauea Plantation, I found a nymph of at the coast near Haena cave.

Records of Native Insects.

Kelisia swezeyi Kirkaldy.—I collected this little leafhopper in tussocks of *Eragrostis* in Olokele Canyon at 1400 feet elevation. The first record of the species on that island.

Kelisia sporobolicola Kirkaldy.—I collected this species abundantly on the grass, *Sporobolus virginicus*, at the beach near the barking sands of Mana. I also secured two specimens from *Eragrostis* at Puu Ka Pele at 3500 feet elevation. The first record of the species for the island.

Melanocrabro discrepans Giffard.—I secured four males of this rare wasp on the trail following the Kauai Electric Power

Line going up to the Summit Camp. This was only collected previously by Mr. Giffard, two males at Kaholuamano, and one male at Waialeale by Mr. Hardy.

Euhyposmocoma trivitella Swezey.—I found the larvae of this pretty little moth abundantly mining the fronds of *Elaphoglossum reticulatum* along the trail to Summit Camp. I reared five specimens of the moth from larvae and pupae brought home.

Omiodes n. sp.—On banana plants at Summit Camp I found leafroller caterpillars, from which I succeeded in rearing one specimen. It much resembles *meyricki*, but the caterpillars were very different from that species, and I consider it another undescribed species. I previously reared *maia* from caterpillars on wild banana plants in the mountains west from Lihue.

NOTES AND EXHIBITIONS.

Holochlora venosa.—Mr. Swezey exhibited a twig of *Sapindus oahuensis* containing eggs of this large Locustid which he found in Waimalu Valley, October 3, 1920, the farthest from Honolulu that this insect has been reported.

Kelisia swezeyi.—Mr. Swezey exhibited a specimen of this little Delphacid collected August 22 in tussock of *Eragrostis* growing on the crest of the S. E. Koolau Range between Konahuanui and Mt. Olympus, at one of the places where the Castle trail reaches the crest.

Rhabdocnemis obscura.—Mr. Swezey reported the capture of a cane borer beetle on a leaf of the native palm, *Pritchardia martii*, on the Castle trail between Konahuanui and Mt. Olympus, August 22nd, 1920.

Kelisia emoloa.—Mr. Swezey reported collecting this little Delphacid in Waimalu Valley, Oahu, July 11th, 1920, on *Eragrostis*.

Scale Insect Records on Maui.—Mr. Ehrhorn reported the collection of *Saissetia oleae* on the akala berry and *Antonina indica* on manienie grass in Alexander Canyon, near Olinda. The latter scale insect was also found on paspalum grass at Haiku.

Plestia sp.—Mr. Muir exhibited two species of *Plestia, anomola* and *kellersi*, showing abnormal venation. The crossveins in one case form a marginal border. The insects were collected in Samoa.

Megachile sp.—Mr. Swezey exhibited five males of a *Megachile* collected at Mokapu on the windward side of Oahu, on *Scaevola koenigii*, which differs from other species of *Megachile* here, in having a furrowed front metatarsus.

Snuff Box Bean.—Mr. Swezey recorded finding a heavy growth of this leguminous plant on the trail following the electric power line crossing the Kauai Mountains, and stated that Mr. Lydgate claimed to know of its presence there since twelve years ago. The appearance of *Eupatorium* on the duckponds of Waikiki two or three years ago was also noted.

Eucnocerus anthrenoides?—Mr. Fullaway reported that on looking over the beetle collection at the Board of Agriculture and Forestry he discovered a specimen of the Dermestid beetle recorded by Mr. Swezey at the August meeting. This example, according to the label, was collected by Mr. W. M. Giffard in October, 1919. Mr. Timberlake collected the same beetle on a window of H. S. P. A. Experiment Station in May, 1919.

NOVEMBER 4th, 1920.

The 182nd meeting of the Hawaiian Entomological Society was held at the usual place. Present: Crawford, presiding; Wilder, Willard, Osborn, Timberlake, Whitney, Muir, Ehrhorn, Swezey and Fullaway. Dr. Tillyard and Mr. King, visitors.

The minutes of the previous meeting were read and approved with corrections.

ENTOMOLOGICAL PROGRAM.

On Some Interesting Archaic Insects (with exhibitions).

BY DR. R. J. TILLYARD,

Chief of the Biological Department, Cawthron Institute of Scientific Research, Nelson, New Zealand.

The insects exhibited consist partly of archaic Australian and New Zealand forms and partly of other interesting forms gathered during my present trip around the world, which will be completed next month when I return to New Zealand. For convenience they may be dealt with under the separate Orders which they represent.

Order Thysanura.

A female specimen of a gigantic Japygid, belonging to the genus *Heterojapyx* (sp. undescribed), from near Sydney, N. S. W.

Specimens of this insect have been found up to fully two inches in length. They live in the soil often at considerable depths, and behave very much like the common centipedes of the genus *Scolopendra*, their mode of progression, in spite of the absence of the paired abdominal legs, being very similar to that of the centipedes. They also have the peculiar habit of working backwards and upwards in the soil until the forceps lies level with the surface, when they will lie in wait for their prey, which they seize with the forceps, dragging it under ground and devouring it when dead.

Two interesting points about the morphology of this fine insect may be mentioned here. The paired stylets of the abdomen show a definite coxite and two distal joints. Hence they would appear to be definitely the serial homologues of the thoracic legs; i. e., they are endopodites instead of epipodites, as has been formerly supposed, on the analogy of the unjointed stylets of other Thysanura with the epipodites of the thoracic legs of *Machilis*. The arrangement of the spiracles, as in all

Japygidae, is very peculiar, the metathorax having two pairs, while the abdomen has only seven pairs, the last being situated on segment seven instead of eight. Börner has suggested that this arrangement has come about through a forward movement of all the abdominal spiracles on to the segment next in front of that on which each pair was originally developed.

Order Grylloblattoidea.

A fine female of the wingless *Grylloblatta campodeiformis* Walker, the only known representative of this order. I took this on October 12 last at 7000 feet elevation on Sulphur Mountain, near Banff, Alta., Canada, during a snowstorm. This is at present the only known locality for this insect, but I have little doubt that it lives on all the snow mountains around Banff and elsewhere in the Rockies. It was first discovered by Mr. N. B. Sanson, Curator of the Rocky Mountain Museum, Banff, more than twenty years ago, but escaped notice, as it was taken for a larval form. A few years ago Professor Walker of Toronto took it, and the result of his study of the insect was its elevation to the dignity of being the sole representative of a new Order. It shows relationships with the Blattoids, Mantoids and also with the Isoptera, and apart from its secondary winglessness, must be regarded as an exceedingly generalized type. Only about six specimens are known.

Order Zoraptera.

A tube containing wingless specimens of *Zorotypus snyderi* Caudell, together with a slide showing the fore and hind wings of the only winged specimen of *Zorotypus hubbardi* Caudell, both being from Florida. The Order was founded by Silvestri on specimens from South Africa and Java; *Zorotypus* is the only known genus.

I visited the laboratory at East Falls Church, Virginia, where these little insects are being kept alive. They live in association with Termites in rotten logs. In life they bear a strong superficial resemblance to Psocids, but morphologically they are more closely related to the Isoptera. The wing-

venation is very puzzling, being of a very reduced type, not like that of the Isoptera, but perhaps related to the very archaic Psocopterous type still preserved in the genus *Amphientomum*.

Order Perlaria or Plecoptera.

A series of archaic genera from Australia and New Zealand, representing the two families *Eustheniidae* and *Austroperlidae*.

After studying the Stoneflies of Australia and New Zealand for many years, it has at last become possible to offer a new classification of this Order, based on the recognition of the existence of a very archaic Antarctic fauna, now confined to Australia, Tasmania, New Zealand, and Chile. Of these, the *Eustheniidae* appear to be the primitive Perlid stock; since, on a calculation based on sixteen important characters used in classification, they are 100 per cent archaic. The genera are: *Eusthenia*, with many species in Tasmania and Victoria; *Stenoperla*, with one widely distributed species in New Zealand; *Diamphipnoa*, with one species of great size in Southern Chile; and two new genera from Australia, not yet described. All these were exhibited except *Diamphipnoa*. The *Austroperlidae*, specialized by reduction of the cerci and by some slight alterations in the venation, contain only the two genera *Austroperla* from New Zealand and *Tasmanoperla* from Tasmania.

A third family of archaic Perlaria, not exhibited, are the *Leptoperlidae*, which is represented by many genera throughout Australia, Tasmania, New Zealand, the Sub-antarctic Islands, and South America as far as Brazil.

The Perlaria of the Northern Hemisphere possess no representatives of these three families, but consist exclusively of more highly evolved families representing two separate lines, of which *Pteronarcidae* and *Perlidae* form one, arising from Eustheniid-like ancestors, and the *Nemouridae* and *Capniidae* the other probably arising from an old Leptoperlid stock.

Order Coleoptera.

A tube containing the larva, pupa and imago of the archaic beetle *Cupes concolor* Westw. from Virginia. Fossils closely

resembling this, and almost certainly belonging to this genus, have been found in the Upper Trias of Ipswich, Queensland, where there exists a very rich Coleopterous fauna, which is the oldest so far discovered.

Order Neuroptera Planipennia.

A series of tubes containing specimens to illustrate the complete life history of the remarkable Australian Moth-Lacewing, *Ithone fusca* Newman. The female of this insect possesses a peculiar sandplough or *psammarotron,* with which it ploughs up the soil when laying its eggs. Each egg, when laid, is sticky, and is rolled in the sand so as to become enclosed in a small sand-cocoon. The larva hatches in about three weeks, at the beginning of December, and at once burrows into the soil. It is a white grub, of melolonthoid form, with strong burrowing legs, a curved body, small head, no eyes, and short, strong sucking mouth parts of the true Planipennian type. It is very active, and feeds voraciously on the larvae of *Scarabaeidae*, which it so much resembles. When digging for these larvae, their presence is at once made known by the delicious odor of citronella which they give out.

There are only three instars, the larva growing very rapidly. It then spins a cocoon in the form of a cylinder with hemispherical ends, and of a whitish, papery consistency, not unlike that of some of the Hymenoptera. In this the larva remains for a long time, finally pupating as a *pupa libera* in which, unlike those of the other Planipennia, the abdomen is not curved round. The pupal stage lasts only three weeks or less. The pupa cuts its way out of the cocoon by means of its powerful mandibles, and the imago crawls up out of the sandy soil and climbs the nearest tree trunk, where it rapidly expands its wings. The imagos fly only at dusk during the first week or so in November, the males assembling around the females on the tree trunks. Their rapid, dashing flight resembles that of *Hepialidae;* and, indeed, they bear a strong superficial resemblance to these moths, for which they are often mistaken by collectors.

In view of the depredations caused by the Green Japanese

Beetle in New Jersey, and by many other *Scarabacidae* in all parts of the world, the importance of the discovery of this life history can scarcely be overestimated. It took many years to work out, without any thought that the results might even prove of economic value. There could scarcely be a better illustration of the value of pure research in entomology than this.

Order Mecoptera.

Three specimens of the wingless Snow Scorpion-fly, *Boreus* sp., from Banff; one specimen of *Chorista australis* Klug, belonging to the archaic family *Choristidae*, and specimens of *Nannochorista dipteroides* Till., from Tasmania, and *Choristella philpotti* Till., from New Zealand, both belonging to the remarkable family *Nannochoristidae*.

The *Choristidae* contains a number of genera confined to eastern Australia, which are the direct descendants of fossil forms found in the Upper Permian and Upper Trias of the same area (genera *Permochorista* and *Mesochorista*, respectively). In all the many millions of years which have elapsed from the Permian until now, during which much of Eastern Australia has never again been submerged, the wings of these insects only show the loss of one terminal branch of vein M; in other respects they have remained quite unaltered.

The *Nannochoristidae* are very small Panorpids which may well be termed "four-winged Diptera." In flight and habits they resemble Diptera very closely. They are aquatic in their larval stages. The head closely resembles that of a primitive Dipteron, and there is a true labellum formed by the fusion of the palpi basally, though the distal joints remain still partially separated. This suggests that the Dipterous labellum has also been evolved by fusion of the palps, and not from the paraglossae. The venation of these insects is similar to that of the Brachycera as regards the main veins, but there are some cross-veins present.

All stages of the larva of *Chorista australis* were also exhibited, together with the pupa, which lies free in the earth.

Order Diptera.

A specimen of the wingless Snow Cranefly, *Chionea valga* Harris, from Banff. The superficial resemblance of this insect to *Boreus* is quite striking.

Order Lepidoptera.

Specimens illustrating the families of the Jugo-frenata, which forms the most archaic division of the Sub-order Homoneura, the other division being the Jugata, families *Hepialidae* and *Prototheoridae*.

In the oldest family *Micropterygidae*, specimens of the New Zealand genera *Micropardalis* and *Sabatinca* were shown, together with specimens of *Micropteryx* from England. The larvae of these insects feed on moss, and are remarkable in possessing a retractile head with three-jointed antennae and small compound eyes, while the abdomen carries a pair of jointed legs on each segment. The newly discovered larva of *Sabatinca barbarica* Philpott was also shown, together with some microscopic preparations of the same, one of which showed very clearly the five-facetted compound eyes.

These insects have been placed by Comstock in the Trichoptera and by Chapman in a new Order Zeugloptera; but a study of the venational characters of the imagines shows very clearly that they are properly to be regarded as true Lepidoptera.

The next family, *Eriocraniidae*, have leaf-mining larvae without either thoracic or abdominal legs. Imagines and young larvae of *Eriocrania purpurella* Haw. were shown.

The third family, *Mnesarchaeidae*, is represented only by the Plutellid-like *Mnesarchaea* from New Zealand. Nothing is known of its life history, but it is probably a moss feeder and a specialized offshoot of the *Micropterygidae* proper; both fore and hind wings have lost one of the original eleven apical veins.

The Green Japanese Beetle in New Jersey

BY J. L. KING,

Of the Pennsylvania Department of Agriculture.

Mr. King discussed at some length the invasion of the States of New Jersey and Pennsylvania by the green Japanese beetle (*Popilia japonica*) and the progress of the work being done to suppress it. He was en route to Japan in search of parasites of this beetle.

Opostega in the Hawaiian Islands (Lep.).

BY O. H. SWEZEY.

In the "Fauna Hawaiiensis," two species of this genus were described and figured: *maculata* Walsm. and *dives* Walsm. The former on a single specimen from Molokai, and the latter on two specimens from Halemanu, Kauai. These are very small moths, and in all of my collecting in the Hawaiian forests I have only once collected a specimen of this genus. It was on the summit of Mt. Kaala of the Waianae Range, Oahu, and was not either one of the described species. I have, however, reared four different species from mines in the leaves of various species of *Pelea*, from various localities on Oahu.

Peculiar mines were discovered in the leaves of *Pelea* a long time ago, but the insect producing them was not ascertained. Finally larvae were found in some of the mines, but at first it could not be determined to what order of insects they belonged. The larvae are very slender, and the head structure very peculiar. In 1910, when I was at the National Museum at Washington, D. C., Mr. Busck showed me some larvae which he had recently received of a species of *Opostega* which is a cambium-miner in *Ribes*. I at once noted the similarity of these larvae to those found in the mines in *Pelea* leaves, and, hence, since then considered that these mines were produced by *Opostega* larvae.

I have repeatedly brought in *Pelea* leaves with mines and

attempted to rear moths from the larvae in them. Many times these have resulted in failure, but occasionally I have secured a moth, and these have proved to be of the genus *Opostega*. There are six different types of the mines in *Pelea* leaves, and probably others not yet known may occur in some of the regions not yet fully explored. The moths that I have reared from these mines are very closely related, but I consider that those from each of the different kinds of mines are different species respectively. Four new species are described herewith.

Some of the mines seem to occur only in certain species of *Pelea*, and sometimes as many as two kinds of mines are found in the same leaf. As far as my observations go, five of the species occur quite generally throughout Oahu. Often I have found these five on the same day in some particular place, as for example: October 31, 1920, in the Koolau Range above Wahiawa, Oahu. Very little is known of their occurrence on the other islands, but three kinds of mines have been found in *Pelea* leaves on Kauai, and there is no doubt that there are other kinds yet to be found.

The types of the species here described are in the collection of the Hawaiian Entomological Society.

Opostega callosa n. sp.

Head white. Eye-caps white, the rest of the antennae very pale brownish. Thorax white. Forewings white with a slight brownish suffusion near base, a mideostal patch of very pale brownish, the apical third of wing suffused with the same shade; a dark fuscous apical spot within a pale brownish line at base of cilia; cilia whitish with a very pale brownish line near tips; expanse 6 mm. Hindwings and cilia creamy white. Abdomen and legs pale tawny buff, front legs with fuscous markings outwardly.

Hab.—Three specimens Waialae Nui, Oahu, February 16, 1919 (*Swezey*); bred from *Pelea rotundifolia*.

The mine of this species (Fig. A) when complete, is a circular callous-like structure about half an inch in diameter, on the upper surface of the leaf. It is formed by the young larva producing at first a very slender mine, and after wandering for a time finally coming to a perfect circle, and then continuing in a close spiral inside of this till the center is reached.

A proliferation of tissue is produced and the upper epidermis thickened up, and the larva feeds beneath it till fully grown, when it escapes for pupation. The cocoon is probably made amongst moss or debris on the ground, and is lenticular in shape, of a pale reddish brown silk. I have never found them in the open. The description is from those made in the moss at bottom of breeding jar in insectary.

Besides *rotundifolia*, I have found the mines of this species in the leaves of *lydgatei* and several undetermined species of *Pelea*. They have been found occurring on all of the ridges of the Koolau Range, Oahu, that I have visited, from Kulioutou to Hauula.

Opostega maculata Walsm.

Walsingham, Fauna Hawaiiensis, I, Part V, p. 711, Pl. XXV, fig. 12 (1907).

I have reared two specimens of this species from *Pelea oblongifolia*, Palolo, Oahu, September 18th, 1915. I have found the mines also in *rotundifolia* and several other undetermined species of *Pelea*, at Waialae Nui, Manoa, Mt. Olympus, Mt. Tantalus, Pacific Heights, Wahiawa, and Punaluu, Oahu.

The mine of this species (Fig. B) is a close spiral produced outwardly from the center where the egg was laid on the upper surface of the leaf. The spiral may turn to the right or to the left. Just before issuing, the larva tunnels a short distance from the spiral. No proliferation of plant tissue takes place in connection with this mine as does with the mine of *callosa*, in fact that is the only species having a proliferation of plant tissue in connection with its mine.

Opostega serpentina n. sp.

Head white. Eye-caps white, remainder of antennae pale brown. Thorax creamy white. Forewings creamy white, a faint brown suffusion on basal third; from one-third of dorsum a brownish streak extends obliquely to near a brownish patch just beyond middle of costa; some faint brownish suffusion in apical third; a small fuscous spot at apex within a brownish line at base of cilia; cilia whitish with a faint brownish line near tips, at apex some are shorter and fuscous tipped while just at each side of these are some longer and fuscous tipped. Expanse 6.5 mm. Hindwings and cilia greyish. Abdomen grey above, tawny buff below. Legs tawny buff, front legs outwardly fuscous.

Hab.—Two specimens Mt. Olympus, Oahu, January 19th, 1919 *(Swezey)*; bred from mines in leaves of *Pelea elliptica*. The mines have been found also in leaves of *P. clusiaefolia* and some other undetermined species at Waialae, Palolo, Konahuanui, Wahiawa, and Punaluu, Oahu, and from *P. sapotaefolia* on Kauai.

The mine of this species (Fig. C) is made at first along the margin of the leaf. As it enlarges it becomes very serpentine, and finally has quite long back-and-forth loops nearly half across the width of the leaf. The cocoon is similar to that of *callosa*. Moths issued from cocoons twenty days after cocoons were formed.

Opostega filiforma n. sp.

Head creamy white between antennae, purplish grey on occiput. Eye-caps white, remainder of antennae missing. Thorax purplish grey. Forewings purplish grey, dorsum fuscous brown except near base, at one-fourth of dorsum a fuscous brown streak extends obliquely to end of cell, at two-thirds of costa a fuscous brown patch with an outwardly oblique extension, costa white before and beyond this patch, a fuscous apical spot preceded by fuscous streak at base of cilia; cilia greyish with a fuscous line about middle, some at apex shorter and fuscous tipped, a few in front of this longer and fight fuscous. Expanse 9 mm. Hindwings and cilia purplish grey. Abdomen purplish grey above, creamy below. Legs greyish, front legs outwardly fuscous.

Hab.—One specimen Mt. Kaala, Oahu, September 26th, 1920 *(Swezey)*; caught on *Pelea clussiaefolia* tree, whose leaves were very much mined by the mine shown in Fig. D. As no other kinds of mines were present, I feel certain that this is the mine of this species of *Opostega*. This same mine is found abundantly in *Pelea elliptica*, where it occurs on Mt. Konahuanui and the other ridges near Honolulu. I have also found them in undetermined species of *Pelea* at Wahiawa. It is a very slender thread-like mine, wandering without any special order throughout the leaf, at the last going down into the petiole and mining in the cambium layer.

Opostega peleana n. sp.

Head white, a creamy tinge on crown. Eye-caps white, the remainder of antennae creamy white. Thorax pale ochreous brown. Forewings pale

ochreous brown, more intense on the outer third, about middle of costa a spot with a slight fuscous tinge, the costa whitish just before and after this spot; cilia creamy, the costal and terminal brownish at base, at apex a dense bunch of them are shorter than the rest with fuscous tips and a black band at middle, just before this a few cilia are darker than the rest. Expanse 7 mm. Hindwings and cilia creamy. Abdomen creamy white. Legs ochreous.

Hab.—One specimen, Mt. Olympus, Oahu, January 12th, 1919 *(Swezey)*, bred from mine in leaf of *Pelea sandwicensis.* The mine of this species is chiefly found in *P. sandwicensis*, but has also been found in *P. rotundifolia* and some undetermined species of *Pelea*. I have found these mines at the following ridges on Oahu: Waialae, Palolo, Mt. Olympus, Wahiawa and Punaluu, and also on Kauai. The mine of this species is shown in Fig. E. It is at first a thread-like mine with numerous longitudinal somewhat parallel loops nearly the length of the leaf and somewhat curved with the concavity towards the margin, the enclosed area eventually becoming a large blotch mine. The whole mine is usually situated on one side of the midrib and occupying nearly that whole half of the leaf.

Opostega sp.

Figure F shows a mine found in leaves of several different species of *Pelea (anisata, kauaiensis* and *gayana)* at Kaholuamano, Kauai *(J. M. Kusche)*. It is an irregular tangle, gradually enlarging as the larva increases in size. No moths have been reared from these mines yet. It would be another new species, unless perchance it were the beautiful species *dives*, described in the "Fauna Hawaiiensis," two specimens of which were collected at Halemanu, Kauai.

These interesting little moths need much further study here in Hawaii. In a paper on the Lepidopterous Genus *Opostega* and its larval Affinities (Proc. Ent. Soc. Wash., 20:27-38, 1918), Carl Heinrich figures the head structure and mouth parts of the larva of one of the Hawaiian species of *Opostega* from material which I had collected. He makes use of this to show affinities of *Opostega* and Opostegidae to the families Nepticu-

lidae, Tischeriidae and Leucopterigidae, as shown by larval characters.

In the forewings of *Opostega* there are no cross veins and only three longitudinal veins. Meyrick speaks of this as the extreme of neural degeneration, while Busck and Heinrich say that this venation of *Opostega* is the most advanced in Lepidoptera.

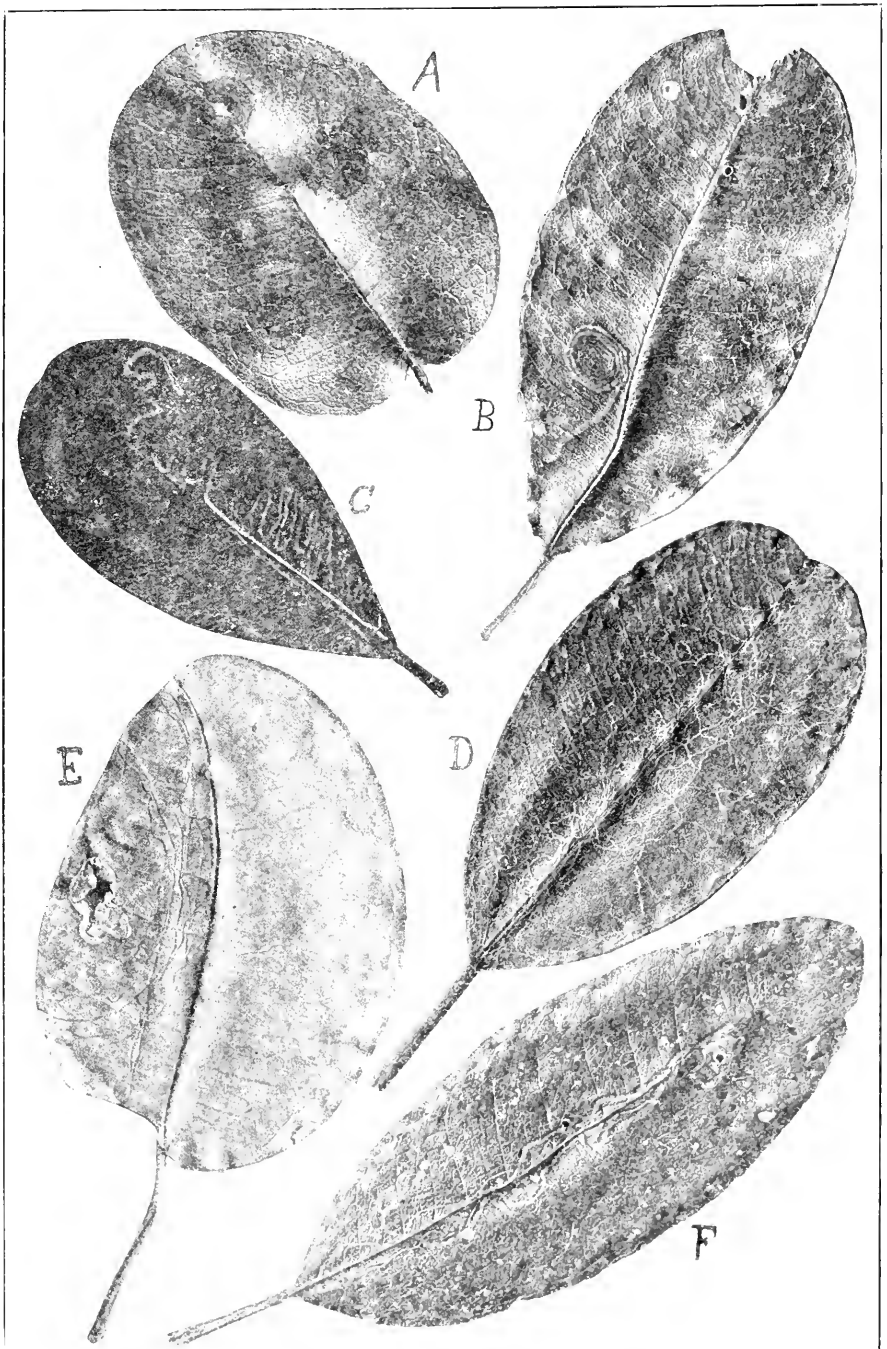
Meyrick has described seven species of *Opostega* in Australia (P. L. S. N. S. W. (2), VII:605-608, 1893), which is more than is known elsewhere. Four are known in England and three in United States. Not much is known of the larval habits, probably the observations above reported are more than known elsewhere.

Chalcid parasites have been bred from the mines in *Pelea*, but their identity is not yet known. Sometimes more parasites issue than moth larvae from the mined leaves brought in.

EXPLANATION OF PLATE IX.

Leaves of various species of Pelea showing mines of larvae of Opostega.

A. Mine of *Opostega callosa*.
B. " " *maculata*.
C. " " *serpentina*.
D. " " *filiforma*.
E. " " *peleana*.
F. Mine of an undetermined species.



Opostega Mines.

DECEMBER 2nd, 1920.

The 183rd meeting of the Hawaiian Entomological Society was held in the usual place, President Crawford presiding. Other members present: Messrs. Willard, Giffard, Timberlake, Muir, Ehrhorn, Whitney, Osborn and Fullaway.

Minutes of previous meeting were read and approved.

Report of the Executive Committee on common names of insects in Hawaii was received and accepted for publication.

A vote of thanks was extended to the Hawaiian Sugar Planters' Association for the contribution of $500 towards the expenses of publication of the Proceedings of the Society.

The Secretary-Treasurer submitted his annual report showing a balance in the treasury of $560.57.

Officers were elected as follows for the year 1921:

President.....P. H. Timberlake
Vice-President.....H. T. Osborn
Secretary-Treasurer.....D. T. Fullaway
Additional members of Executive Committee:
W. M. Giffard
F. Muir

ANNUAL ADDRESS.

Honey-Dew Smut and Photosynthesis.

BY DAVID L. CRAWFORD.

Most homopterous sap-feeding insects excrete a considerable quantity of honey-dew which spreads over the foliage and stems and supports the growth of certain epiphytic fungi. The mycelium of these fungi is black and usually forms a crust adhering to the surface of leaves, stems and fruit.

Sugar cane leaves are commonly blackened by this "smut" where the *Perkinsiella* leaf-hopper occurs in quantity. Avocado foliage is frequently badly crusted by the presence of mealy-bugs (*Pseudococcus nipae*). Orange leaves and fruits as well are commonly blackened by the mold. In California this is due primarily to the black scale (*Saissetia oleae*) and is considered as a very serious detriment to successful citriculture. In Florida a similar smutting on citrus leaves is caused by Aleyrodidae.

Plants which become encrusted with honey-dew smut are more or less dwarfed or stunted or otherwise injured. Sugar cane plants are commonly stunted and citrus foliage when smutted is usually dwarfed. Fruit trees often fail to set fruit when the foliage is badly covered with smut.

Very obviously a part, at least, of this injury is due to the removal of sap by the insects, a state of starvation resulting. It is commonly believed, however, that the presence of a black crust on the leaves is an additional injury, cutting off part or all of the light energy which is needed for photosynthesis, and thus reducing the rate of food manufacture in the leaves and bringing about a condition of starvation.

This appears to be a very logical conclusion, for plant physiology teaches that luminous energy is one of the indispensable factors in photosynthesis, and when a screen is interposed between a green leaf surface and the light source in such a way as to exclude all light, photosynthesis ceases. The honey-dew smut is black and often thick enough to exclude

Proc. Haw. Ent. Soc., IV, No. 3, September, 1921.

much or all of the light falling on a leaf surface, hence photosynthesis theoretically must cease and starvation of plant tissues result.

However, we know that for many years fruit growers have sprayed their orchard trees with insecticides and fungicides containing lime, and that the coating left on the foliage sometimes for weeks appears to work no injury whatever. Instead, the foliage seems more healthy and vigorous. This lime coating is not black and opaque, but it is semi-opaque and excludes a considerable part of the illumination falling upon it.

The question naturally arises, then, as to the actual effect upon photosynthesis of a leaf coating of any sort or color. Does a coating or crust of any material on a leaf surface function to reduce or retard photosynthesis as does an opaque screen when interposed between leaf and light source?

When a green plant is surrounded by a screen which excludes all light but admits air, the reserve starch in the leaves is used up and none is elaborated to replace it. An examination after several hours shows an absence of starch.

During the night most plants use up the excess starch stored in the leaves during the day, so that an examination at dawn will normally show an absence of that carbohydrate. Such is the case with orange leaves.

Now, if a leaf coating of honey-dew smut or of carbon-black or of any other substance acts like an opaque screen to reduce or inhibit photosynthesis, we should expect to find a shortage or absence of starch in the leaf beneath the coating.

There are two means of determining the presence or absence of carbohydrates in green leaves. One of these, known as Sach's Method, is comparing dry weights of equal areas of leaf tissues. The other is the familiar iodine test for starch. The first tests for all carbohydrates, the second for starch only.

In connection with protracted investigation carried on by the writer in California upon the subject of alleged injury to orange trees by deposition of cement dust on the foliage, some important data is available on the larger subject which forms the basis of this paper.

The Effect on Photosynthesis of Various Leaf Coatings.

The luminous portion of radiant energy appears to be indispensable in the photosynthetic work of green leaves, and it is a prevailing idea that this energy must fall upon the leaf surface as illumination to be effective in carbon assimilation. A screen reduces the rate of carbon fixation in proportion to the amount of illumination intercepted, seeming therefore to bear out these statements. It is not at all clear in what manner the illumination falling upon a leaf cell transfers its energy to the chlorophyll to enable it to carry on its photosynthetic function.

Temperature is recognized as a very important factor in photosynthesis, perhaps even more important than illumination, for these are chemical reactions and subject to the Van t'Hoff-Arrhenious law of increasing rate of reactions in a rising temperature, even though the coefficient of increase may differ in the several chemical processes which comprise photosynthesis. Much of the radiant energy falling upon and absorbed by a leaf surface appears to be utilized by the cells as heat, only about 0.5 to 3.0 per cent being used as *light* energy, according to the views of many physiologists.

Citrus, especially sweet orange, leaves are very favorable for these studies because there are no stomata on the upper surface, and also because during the night practically all the starch stored during the day is used up. Microtome sections of leaves removed from the tree just before dawn and stained in iodine show that only a few chloroplastids here and there in the mesophyll cells have any starch remaining in them.

Structure of an Orange Leaf.

An orange leaf has a rather thick epidermis, especially on the side exposed to the sunlight directly. Beneath this there are two layers of palisade cells, and a partial third layer, very closely crowded together. Leaves which grow near the trunk or heart of the tree and are thereby shaded by the outer foliage are very much thinner than the outer leaves, from one-half to four-fifths as thick. The palisade cells, moreover, are in only

one layer with sometimes a partial second layer. The mesophyll cells are very spongy, with large cavities between them. The stomata are all on the under surface of the leaf.

Methods.

Several methods were used to determine the effects of the surface coatings on leaves. Two methods were found especially satisfactory. One of these was essentially Sach's method for determining by weight the increase of dry matter in a leaf during the daytime. Many leaves were prepared on the tree with one-half of the upper surface coated with a given substance and the other half not coated and the lower surface remaining normal. Usually the midrib was taken as the dividing line between the two halves, but in some leaves the half near the petiole or in others the apical half was coated. In all cases a sufficiently large number of leaves was employed to secure more accuracy. Several days were allowed to elapse between the time of coating the leaves and using them further in the experiment so that the leaf might accommodate itself to the changed conditions. In the morning, before daybreak, one circular disc of one sq. cm. area was cut from each half of a hundred or more leaves very carefully, and quickly killed in an oven after having been carefully cleaned in water by rubbing with the fingers. In cutting these discs the larger veins were avoided, although it may be said that orange leaves do not have as prominent veins as many other plants often used in such experiments as this. In the middle afternoon the same leaves were cut from the tree, cleaned in the laboratory thoroughly and as quickly as possible, and then a number of discs were cut, with the same instrument as used in the morning, from each half. These four lots of discs were dried at 100 degrees C. for about two days, or until thoroughly dried, and then weighed to .001 of a gram. The relative weights per square meter area were computed, the greater weight of the discs cut in the afternoon representing accumulated dry matter. No attempt was made to determine what this dry matter consisted of, but presumably it was mostly starch and sugars.

Some objections have been raised by certain physiologists

with the thought that this method, of cutting out discs and weighing them dried, is not a correct or adequate means of determining the amount of carbon assimilation during the day. There is more or less truth in these assertions, for it is difficult to determine the rate of translocation, and hence it is only a test of the accumulation of products. It is possible that it is a slight shock to the leaf to have a couple of round discs of one sq. cm. area cut from it, and perhaps there is a slight temporary effect on the metabolic activities of the remaining portion of the leaf. But, nevertheless, for the purposes of these studies this method is wholly satisfactory and adequate. It is safe to assume that the shock to one-half the leaf is not greater nor less than to the other half, and hence the value of the comparison is not impaired whether there is a slight shock to the leaf, or not. Again, since light seems to have somewhat of an inhibitory effect on the diastase action in digestion and removal of starch, and since translocation of sugars appears to be somewhat increased in rate when the temperature rises and it appears, further, the presence of a dust coat or surface coating of any sort tends to slightly increase the temperature and, therefore, slightly accelerate translocation of sugars, we may conclude safely that in the coated half of the leaf the rate of translocation is at least not reduced, and when we consider all the facts it appears that probably it is substantially unchanged. We may, therefore, conclude that the weight of accumulated dry matter in each half of a hundred or more leaves is, at least, a good comparative test when we are seeking to determine the ratio of photosynthetic activity in two parts of the same leaf. Whether or not this method is adequate for testing the total assimilation of carbon during a given period of time is a question with which we are in this study not in the least concerned.

The other of the two principal methods used was the examination microscopically of microtome sections of leaves stained in iodine. This, of course, is a check only on the starch and not on all carbohydrates. Leaves were treated as outlined above, a portion of the upper surface being coated and the

remainder left clean. Narrow strips were cut from these leaves in the afternoon and after fixation in chrome-acetic solution and infiltration with paraffine, they were sectioned with a microtome. Sections were in all cases made 10 micro-mm. thick. They were stained in iodine dissolved in xylol, mounted in balsam, and as soon as possible a typical spot was photographed. Study of photographing of these sections must be done quickly, for the iodine is soluble in balsam and the color soon fades out. By this method one can gain a good idea of the comparative amounts of starch in sections, but by no means is it a quantitative test. Unless the sections are of uniform thickness the comparison is valueless, for it is obvious that the mass color effect of the stained starch in two layers of cells would be much greater than that of one layer of cells. A great many leaves were sectioned and photographed in this manner.

Increased Dry Matter.

In determining the effect of a cement dust coating on orange leaves the studies were made in two localities—in the region about the Riverside Portland Cement Company's plant where the leaves were coated by dust blown into the atmosphere, and also in Claremont. In the latter place leaves were partially covered with a paste made from "treator dust," which is the same as that blown into the atmosphere at the cement plant. In the Riverside region the procedure was as follows: Many of the most heavily coated leaves were very carefully cleaned with a dampened cloth on one-half of the surface. Usually the midrib was taken as the dividing line, but in some series the basal or apical half was cleaned. Thus cleaned, the leaves were allowed to remain on the tree for several days, and then discs were cut out before daybreak and again in the afternoon, as above set forth. Records were kept of the average temperatures during the experiments and of the conditions of the sky, weather, etc., whether bright or cloudy. These experiments were repeated on several days throughout the late summer, fall, winter and spring.

Another means of comparing the quantity of carbon fixation in coated and uncoated leaves was tried. One-half of the surface of many leaves was cleaned, as before, and the leaves allowed to remain on the tree for several days. At about the middle of the afternoon these leaves were cut from the tree, quickly brought into the laboratory and carefully cleaned, and then a number of discs were cut from each half. These were dried thoroughly and their dry weights compared. As a check on this method, I first cut a number of ordinary orange leaves, cleaned them carefully, and from each side of the midrib of each leaf cut an equal number of discs. The two lots of discs taken from opposite halves of each leaf were then dried and weighed. The dry weights of these two lots of discs were almost identical, showing that when a considerable number of leaves are used the dry weight is practically the same on each side of the midrib, per unit area. A number of tests were then made to determine any difference which might exist between the clean and coated halves of leaves. This does not determine the quantity of carbohydrates made nor does it do more than simply give a comparison between the two. If unit areas on each side of the leaf normally weigh the same, but when one side is coated with a dust film it should be found that the dry weight per unit area diminishes, it might then be assumed that less carbon was being fixed beneath the coating on the surface. If, however, the dry weight of the coated side remains practically the same as that of the other side, then we may conclude that it corroborates the data of the tests just preceding. This is the case, as the following tables show. The differences in dry weights of the two halves are practically identical, the slight differences being probably only experimental error. This method, alone, of determining carbon assimilation is wholly inadequate, but as a corroborative test with that in which the hourly rate of fixation was made, it is quite worth while.

COMPARISON OF DRY WEIGHT PER SQUARE METER OF LEAF TISSUE OF CLEAN AND COATED LEAVES.

Time of cutting	Number of discs	Weight, per sq. meter clean	coated	Difference
7 a. m.	143	118.321	118.955	0.634 grams
2 p. m.	64	110.938	111.250	0.212 "
2 p. m.	100	105.408	105.287	0.121 "
3 p. m.	138	103.607	103.110	0.497 "
1 p. m.	218	106.835	106.718	0.117 "
1:30 p. m.	276	106.70	107.370	0.670 "
	Average:—	108.635	108.781	0.146 "

Check:—114 discs cut from each side of midrib of 40 normal leaves:—Lot 1, 101.316 grams
Lot 2, 101.623 "
Difference—0.307 grams

It appears very certain from these data that the presence of a coating of cement dust is not diminishing in the least the rate of carbon assimilation. The differences in weights of coated and clean parts of the leaves by both methods of testing, above outlined, are very small and to be accounted for simply as experimental error. These same tests were repeated in Claremont, using leaves which were heavily coated on one-half of the upper surface with a paste made of cement dust. This coating was much thicker than that found on the leaves in the dustfall zone about the cement plant. By weighing discs cut in the early morning and in the afternoon, as before, it was found that even this thick coating did not reduce the amount of carbon assimilation in the least. The average of several tests made in Claremont shows a difference in favor of the clean side of the leaves of 0.047 grams.

It seemed evident from the latter tests that not much illumination could enter the leaf through such a thick coating, and this led to making similar tests with orange leaves coated on half of the upper surface with lampblack paste. Obviously this would intercept practically all the luminous rays of sunlight. Proceeding as before, it was determined by the weighing of many discs that fixation of carbon progressed very normally beneath this heavy coating of lampblack, the gain in dry matter being quite equal to that of the unblackened half of the leaves.

At the same time similar tests were made to determine the effect of smut growth on scale-infested trees, and it was found that here again the black covering was not reducing in the least the amount of carbon assimilation. It appears from this latter that the real injury to the orange tree is not from the smut (except as it affects the salability of the fruit), but from the sucking out of sap by the scale insects.

As a check on the foregoing tests a great many microscopic examinations of leaf sections have been made, as previously explained. Leaves in the Riverside district coated by the falling cement dust were partially cleaned and left on the trees for several days. Then sections were cut from the coated and the clean portions of the leaf and stained with iodine. In no case, among the many hundred sections made, was there any indications of there being substantially more starch on either of the two sides or portions of the leaf. Many leaves at different seasons of the year and on different kinds of days, cloudy and sunny, have been examined and no differences have been discovered. Peirce * asserts that leaves partially cleaned, as I have explained above, and sectioned and stained with iodine, show four or five times as much starch in the cells of the clean side as of the coated side. Certainly nothing in the tests reported above would bear Peirce out in this statement even to a slight degree. Peirce used hand sections decolorized and stained in iodine, and it is quite probable that there is a source of error, for it is obvious that a slightly thicker section would appear to have more starch in it than a thinner one; and furthermore, in a freehand section the chloroplastids are quite apt to fall out and leave the cells empty, and thus increase the effect of starch shortage.

In the same way a great many sections have been made of leaves partially coated with lampblack, thickly. These examinations confirm the conclusions derived from the comparison of dry weights of discs cut from blackened and clean parts of leaves, for in no case did there appear to be any less starch in the coated portion than in the clean. In fact, not a few

* Peirce, G. J., Plant World, Vol. 13, p. 286, 1910.

sections showed more accumulated starch in the palisade cells under the black coat than where the coat was absent.

Since such a coating of lampblack as was used in these tests absorbs and intercepts practically all the luminous rays of sunlight which fall upon the upper surface of the leaf, and since it was found that carbon assimilation progressed normally in spite of the black coat, only two possible explanations were apparent. Either enough diffuse light entered the leaf from beneath, for this surface was not coated, or else the light rays falling upon the black surface were absorbed, transformed and transmitted as another form of energy into the leaf cells beneath where this energy became effective in photosynthesis.

Upon the under surface of some orange leaves, which several days before had been coated heavily with lampblack on the upper surface, were attached some lightproof boxes. Some of these were Ganong's partial leaf form light screen, and others were a somewhat different home-made type which were even more effective than the Ganong type for excluding light while admitting the passage of air to the stomata on the lower leaf surface. These light screens were attached to the partially coated leaves at evening time and allowed to remain until the next afternoon. The leaves were then removed from the tree and narrow strips cut from three areas, as follows: (1) From an area which had been uncoated above and not screened beneath, (2) from an area which had been coated with lampblack above and not screened beneath, and (3) from an area which had been coated with lampblack above and protected from the entrance of light to the lower surface by a light screen. In some instances the portion clean above but screened beneath was also cut for sectioning. These strips were then prepared for microtome sectioning, sectioned ten microns thick and stained with iodine and photographed.

Careful examination of hundreds of these sections has convinced me that as much carbon was fixed in that portion blackened above and screened beneath as in the portion entirely clean and not screened beneath. This, then, leads us to the conclusion that the energy which effects the carbon assimilation is entering through the surface coating, no matter what that material may be nor what its color or opacity may be.

Discussion of Data.

It is very obvious from the foregoing tests that a surface coating does not affect leaf functions in the same way that a screen does, for in the latter case most or all of the heat energy of the light is excluded at the same time that the illumination is reduced. It must appear from the foregoing data that the presence of a dust coat or even of a black coating, as lampblack or a smut growth, is not injurious to the leaf in so far as the function of carbon assimilation is concerned.

Orange leaves coated for two or three years are just as bright and green when the dust is removed as a normally clean leaf of the same age is. Chlorophyll solutions of equal area of tissue of cleaned and of coated leaves have been repeatedly compared and no diminution of chlorophyll has been detected by the writer in leaves coated with dust. Similar tests of leaves coated with lampblack for four or five months have been made with the same results. These latter leaves appeared as normal and thrifty and green on the black-coated half as on the other, although the coat had been applied for four months.

This has an important bearing on several problems in horticultural science. First, spraying trees does not impair the function of food manufacture in the leaves, provided the spray is not caustic. Second, dust coats on leaves, so long as the stomata are not clogged, do not impair the food-making functions, assertions to the contrary notwithstanding. Third, fungus smut on scale-infested trees does not reduce carbon assimilation. Two injuries may be discovered in such trees. The scale insects themselves are sucking out a very large amount of sap and starving the trees; and, second, the black coat may increase transpiration to a dangerous degree.

It appears from certain of these tests that more radiant energy is absorbed by a coated leaf, and hence, the internal temperature would be increased. No attempt has been made in these experiments to determine the leaf temperature, but it seems probable that any increased temperature would be equalized by the increase of transpiration, so that the actual temperature would be about the same as in an uncoated leaf, but the number of heat units in the leaf would be much greater.

Martin * states that increase in transpiration in a spray-coated leaf probably is not to be explained by the increased temperature. If, however, a leaf normally reflects from its surface a large percentage, perhaps 50 per cent, of the incident radiant energy, but a coated leaf perhaps not more than 20 per cent, the increase in heat units within the coated leaf would be considerable and might well explain the increased transpiration.

In most of the stained sections of coated and uncoated leaves it was found that more starch accumulated in the palisade cells beneath a surface coating, whether the coating were opaque or not, than accumulated in the palisade cells of a clean leaf. This might indicate that some element or quality of direct sunlight inhibits somewhat the photosynthetic activity in the outer palisade cells, and that this inhibitive element or quality is removed by the presence of a surface coating. Perhaps it is merely the illumination itself which is the inhibitive factor, and that the normal function of the outer densely chlorophyllous palisade cells is to *screen out* the illumination and transform its energy to another form useful to the leaf cells. In an uncoated orange leaf the greatest amount of starch, by the iodine-stained section test, is accumulated in the mesophyll cells, but in a coated leaf as great an amount seems to be accumulated in the palisade cells.

It is interesting to note, too, that in those leaves which were coated above with lampblack and darkened beneath with a light screen the mesophyll cells next to the lower epidermis showed as much starch accumulation as did the corresponding cells in a normally illuminated leaf.

Conclusion.

From the foregoing experimental data we may draw at least one conclusion. While photosynthesis depends on illumination for its energy, that illumination need not fall actually upon the leaf surface. A more or less opaque surface coating on the leaf does not exclude the energy of illumination falling upon it, but transfers that energy in some form through to the leaf cells.

* Martin, W. H., Journal of Agr. Res., Washington, 1916: 529-547. See also, Duggar, The Effect of Surface Films on the Rate of Transpiration, Ann. Missouri Bot. Garden.

Notes on the Hawaiian Bees of the Genus Megachile (Hymenoptera).

BY P. H. TIMBERLAKE.

The discovery of a fifth species of *Megachile* on Oahu brings up the question of the endemicity of these bees. Dr. Perkins in the Introduction to the Fauna Hawaiiensis (Vol. I, part 6, p. lxxxiii, 1913) considers that the three species then known were probably all introduced, two of these, *Megachile palmarum* Perkins, and *M. schauinslandi* Alfken, being in fact at that time recent immigrants. A little later as recorded in a footnote on p. lxxiii, he states that *palmarum* was known to him from California and *schauinslandi* from China. Meade-Waldo (Ann. and Mag. Nat. Hist. (8), 10, p. 464, 1912) also records a male *Megachile* from Dehra Dun, India, which had been determined previously by Dr. Perkins as *schauinslandi*.*

Megachile diligens Smith, and *timberlakei* Cockerell, have never been taken elsewhere, but this surely is no proof of their endemicity and they will probably be identified from other parts of the world sooner or later.

* Since the above statement was written, a note by Dr. Cockerell has been seen (Ann. and Mag. Nat. Hist. (9), 2, p. 388, 1918), in which the synonymy of *M. schauinslandi* with *M. umbripennis* Smith is mentioned, based on a determination by Friese in which Cockerell concurs. *M. umbripennis* was described from the northern part of India and has been recorded from Nepal, Sikkim and Tenasserim. It is said to have a narrow, fulvous marginal fringe on the second and third tergites of the abdomen, usually much obliterated, especially on the third segment; and a short, white marginal fringe on the sides of the fourth and fifth tergites. Local specimens of *schauinslandi* have a short, pale fulvous, marginal fringe on the sides of the second tergite; similar, but white, fringes on the third and fourth tergites, and a complete narrow, white fringe across the apical margin of the fifth tergite. As Hawaiian specimens show no variation in these characters, I am disposed to accord the difference considerable weight, although they may finally prove to be only sub-specific. It seems probable that our species was introduced from China rather than from India, and until it can be shown that there is intergradation in the above characters it would be better to consider *schauinslandi* distinct.

The latest introduction of these bees turns out to be *Megachile fullawayi*, which Dr. Cockerell described from Guam as late as 1914, but it is likely that the species was brought by commerce to these islands from some other part of the Oriental region, as our communications with Guam are not extensive.

The conclusion that all of our *Megachile* are immigrant species is therefore supported by the fact that three of the five species have been found elsewhere.

Table of Hawaiian Megachile.

Females 5
Males 1

1. Front coxae armed with a distinct strong spine..... 2
   Front coxae with a very small or rudimentary spine; pubescence short, fulvous on thorax above and on the first tergite of abdomen. *M. schauinslandi* Alfken

2. Basitarsus of front legs simple..... 3
   Basitarsus of front legs with a deep longitudinal furrow beneath; abdomen with dorsal and ventral apical hair-bands pale to rather deep ochreous.....*M. fullawayi* Cockerell

3. Basitarsus of front legs narrow or not more than twice as wide as the apical joint of the tarsus..... 4
   Basitarsus of front legs about three times as wide as the apical joint of the tarsus, its apex truncate and only slightly oblique; pubescence on abdomen deep fulvous.....*M. diligens* Smith

4. Front tarsi comparatively thick, the basal joint triquetrous, flattened above, the apex truncate and then produced at the anterior corner into a point overlapping the second joint, its ventro-anterior surface covered with dense semi-erect reddish hair on either side but leaving a central, narrow longitudinal bare line; thorax with erect, not very long, pubescence above, mostly white or pale yellowish, but intermixed with brown or blackish hairs on the disk of the mesoscutum; apical keel of the 6th tergite of abdomen deeply emarginate.....*M. palmarum* Perkins
   Front tarsi slender, the basal joint more nearly cylindrical, the ventro-anterior surface without a bare streak, its apex nearly as in *palmarum*, but less strongly produced; thorax with short erect pubescence, pale ochreous to rather distinctly yellowish in color, and with short appressed scale-like hairs on the mesoscutum, especially towards its anterior and posterior margins; apical keel of the 6th tergite of abdomen weakly emarginate.
   M. timberlakei Cockerell

5. Thorax above and basal tergite of abdomen with whitish to ochreous pubescence, sometimes with dark hair intermixed on the thorax; ventral scopa comparatively dense..... 6

Thorax above and basal tergite of abdomen with dense, mostly short and appressed pubescence of a deep, bright fulvous color; ventral scopa thin.....*M. schauinslandi* Alfken

6. Venter of abdomen without white apical hair-bands..... 7
Venter with narrow white apical hair-bands beneath and distinct from the scopa..... 8

7. Ventral scopa bright fulvous in color; pubescence on thorax ochreous, becoming griseous on the sides of the mesoscutum; abdomen with narrow, fulvous apical hair-bands on tergites 2 to 5.
M. diligens Smith

Ventral scopa very pale fulvous to pale ochreous; pubescence on disk of thorax sparse, short and erect, whitish on the sides, but much intermixed with blackish hairs medially, the disk also with very fine, pale appressed hairs; abdomen with narrow, white apical hair-bands on tergites 2 to 5 and an apical white fringe on the first tergite.....*M. palmarum* Perkins

8. Ventral scopa rather bright fulvous changing anteriorly to creamy white on the second ventrite; pubescence of face and thorax white, on the disk of the mesoscutum sparse and short with some brownish hairs intermixed, and also a few appressed white scale-like hairs anteriorly on the mesoscutum and along the anterior and posterior margins of the scutellum; abdomen with narrow, white apical hair-bands on the first five tergites.
M. fullawayi Cockerell

Ventral scopa creamy white to pale ochreous; pubescence of face and thorax ochreous or in part yellowish, the disk of the mesoscutum in perfect specimens almost concealed by short, appressed scale-like ochreous hair, with longer, erect and brownish hairs intermixed, first five tergites of abdomen with narrow, apical hair-bands pale ochreous to creamy white, the last band generally whiter than those preceding.....*M. timberlakei* Cockerell

Megachile schauinslandi Alfken.

Alfken, Entom. Nachr., 24, p. 340, 1898.

An abundant species, and may be seen in large numbers visiting the flowers of the Mexican creeper, *Antigonon leptopus*, and less frequently the flower of *Bidens pilosa*, *Citrus* and prob-

ably other plants. It builds its cells of resinous material and is sometimes a nuisance because of its fondness of choosing a keyhole for its nesting site, but doubtlessly other crevices about buildings, walls or fences are utilized. It probably occurs on all the islands and I have seen specimens from Kauai, Oahu, Maui and Hawaii. As before stated, it is also known from China and India.

Megachile diligens Smith.

Smith, Journ. Linn. Soc. Zool., 14, p. 684, 1879.

This species was first collected by Blackburn in Honolulu and has never been found in other parts of the world. Perkins records it from Oahu, Molokai and Kona, Hawaii, and I have seen specimens from Kauai (Koebele); Kaena Point (Giffard) and Waimanalo (Swezey) on Oahu; Kahuku, Hilea and Honuapo, Kau district (Giffard), Kaawaloa, Kealakekua (Giffard) and Napoopoo (Giffard, Swezey), Kona district on Hawaii. It has become comparatively rare in recent years, as remarked by Perkins, and its nesting habits remain largely unknown. According to Blackburn, it forms its nest of leaves of a species of *Acacia* (presumably *Cassia* was meant) rolled up into cylindrical cells, which are joined one at the end of another.

Megachile palmarum Perkins.

Perkins, Fauna Hawaiiensis, vol. I, part 1, p. 114, 1899.

This species was recorded by Perkins indefinitely from several islands, but was certainly taken by him on Oahu. I have seen specimens from the following localities: Kauai (Koebele); Kaimuki (Swezey, Timberlake), Aiea, Pearl Harbor, Oahu Sugar Co. Plantation (Swezey), South Waianae Mts. (Williams), Oahu; and Puunene, Maui (Swezey). It is also recorded by Perkins from California.

It may be found visiting the flowers of *Antigonon leptopus,* although greatly outnumbered during the last few years in Honolulu by *schauinslandi* and *timberlakei.* It builds its nest in the creases of the under surface of palm leaves and probably

in other similar places. The cells are arranged several together end to end, each being cylindrical in shape, bluntly rounded at the basal and concave at the opposite end, from which issuance takes place. They fit so loosely together that they may be readily broken apart without causing material damage, but are nevertheless neatly fashioned, the leaf-segments closely worked into place. The apical end is sometimes formed of a separate circular segment of about the same diameter as the cell. In size the cells are about 6 or 7 by 9 to 13 mm. The larva, on completing its growth, lines the cell with a dark brown layer of silk.

Megachile timberlakei Cockerell.

Cockerell, Canad. Entom. 52, p. 119, 1920.

This species was taken in Honolulu as early as July, 1904 (Terry), and it is probable that Perkins confused it with *palmarum*, as his description of the scopa of the latter species applies much better to *timberlakei*. It has been collected as follows: on the coast of Kauai (Giffard); Makua (Swezey, Giffard, Timberlake), Kahala (Giffard), Honolulu, including Kaimuki and Waikiki (Terry, Swezey, Timberlake, Bridwell and Williams), Ewa Coral Plain (Swezey) and Makapuu Head (Williams) on Oahu; Lahaina (Timberlake) and Puunene (Swezey) on Maui; Maunalei, Lanai (Giffard) and Kawaihae, Hawaii (Swezey). The bees visit the flowers of *Antigonon leptopus*, *Bidens pilosa* and presumably other flowers. If I remember rightly they were found at Makua, visiting the flowers of the littoral species of sandalwood (*Santalum littorale*). During the summer months the females are frequently seen on windows in houses, and this unusual habit for a bee is explained by their fondness of nesting about houses. *M. schauinslandi* is also often found on windows, and its presence there may be explained in the same way.

The nests of *timberlakei* are found in crevices about houses and consist of long strings of cells attached end to end and so firmly joined by the overlapping leaf-segments that they do not readily come apart but form a continuous cylinder. These cylinders present rather a ragged appearance, as the outer leaf-

segments are loosely attached at one end and flare out to a more or less degree, so that the structure on the whole is less neat and compact than in *palmarum*. The partition between the cells is formed out of much larger leaf-segments than in the latter species, and these segments are worked to a greater degree into the side walls of the cells. In size each cell is about 8 or 9 mm. long and 7 mm. in diameter. The pupal cocoon in this species is dull brownish on the outside and darker, shining or almost black within.

Megachile fullawayi Cockerell.

Cockerell, Ann. and Mag. Nat. Hist. (8), 14, p. 2, 1914.

This species, which was described from Guam, was first taken here December 14, 1919, in Makiki Valley (Williams) and thus practically within the city limits of Honolulu. It has been collected further as follows: Manoa Valley, January 1, 1920 (Williams); Makapuu Head, January 25, 1920 (Williams); Mokapu Point, August 29, 1920 (Swezey), and Manoa Valley, January, 1921 (Ehrhorn), all these localities being on the southeastern end of Oahu. The bees were found by Mr. Swezey at the flowers of *Scaevola koenigii*, and by Mr. Ehrhorn at those of *Antigonon leptopus*. Further observations on the habits of this bee have not been made.

This bee agrees perfectly with Dr. Cockerell's description, but as the peculiar front tarsi of the male were not mentioned, I sent a male specimen to the U. S. National Museum and requested Mr. Rohwer to compare it with the type of *fullawayi*. Mr. Rohwer promptly complied with my request and wrote that: "The type *fullawayi* has the pubescence yellower and denser; the dentation of the apical segment deeper, more pronounced and with narrower teeth; has the pubescence on the fifth tergite longer and denser; has the broad, inner tooth of the right mandible oblique, wider and with a faint sulcus which makes a slight apical indentation above the middle (in your specimen the tooth of the right mandible is narrower, truncate and without a sulcus). Otherwise I do not note any characters and if the material which you have before you shows any variation it might be well to hesitate before describing it as new. The

type of *fullawayi* has the mandibles partly closed and it is impossible to examine the left mandible. In both specimens the first tergite conceals the posterior face of the propodeum, but I do not think there are any differences to be found on the sclerite. There is no difference in the basal joint of the anterior tarsus in the two specimens."

As the material so far accumulated shows considerable variation in the male, especially as to the color of the pubescence and dentation of the apical segment, and to a less degree in respect to the mandibles and the hair on the fifth tergite, I have no hesitation in regarding the identity of the local material with *fullawayi* as fully established.

Description of a New Species of Octetrastichus from Formosa (Hymen., Chalcid.).

BY P. H. TIMBERLAKE.

In February, 1916, Mr. F. Muir brought with him from Formosa to Honolulu some midribs of sugar cane leaves from which at least two species of *Ootetrastichus* were reared. One of these which was obtained in considerable numbers was placed in breeding cages and also liberated directly in the sugar cane fields of Oahu, but apparently did not reproduce under either condition, and certainly not in the breeding cages. Of the second species about twenty females and a few males were obtained and these were placed in breeding cages. Contrary to the results with the first species, this one, which is described below as *O. formosanus*, immediately began to reproduce on the eggs of *Perkinsiella saccharicida*, and the first generation at Honolulu amounted to about 78 males and 11 females; the second to about 93 males and 169 females; and the third generation to about 512 males and 530 females. After this the generations were inextricably confused and the species was bred in large numbers for distribution on the sugar cane plantations of Kauai, Oahu, Maui and Hawaii. The work was continued throughout 1916 and 1917 and at

Proc. Haw. Ent. Soc., IV, No. 3, September, 1921.

the end of this time the parasites were found well established on many of the plantations.

Additional material was received from Formosa in December, 1916, from H. Sauter, arrangements for which had been made months earlier before it had become certain whether the *Ootetrastichus* would reproduce freely in the breeding cages. Both this and the original material collected by Mr. Muir was obtained in the vicinity of Tainan.

The following description is based almost wholly on Hawaiian-bred material, as the original specimens from Formosa were almost all utilized in the breeding cages.

Ootetrastichus formosanus n. sp.

This species is closely allied to *O. pallidipes* Perkins from Java and the male clearly runs to *pallidipes* in Perkins' table (Bull. No. 10, Ent. Ser. Haw. Sugar Planters' Station, p. 7-8). It differs from the male type of *pallidipes* in having the scape not quite so broadly expanded and without conspicuous bristles on the dorsal margin, the parapsides largely pale except anteriorly (as seen in slide mounts), the mesopleura with a much larger pale area, and in having the basal half of the abdomen yellow without a pair of dark spots above on either side. The female has the base of the abdomen distinctly yellow, so that this sex runs better to *O. basalis* Perkins, also from Java. From the type of *basalis* the female differs in having slightly longer wings with the discal ciliation of the hind pair much longer and darker, and in having the yellow and metallic parts of the abdomen more sharply differentiated, with the apical half more strongly metallic. Of the Australian species described by Girault (Mem. Queensland Mus. 2, pp. 216-223) *inghamensis* appears to be similar to *formosanus*, but it is too briefly described to permit any exact comparison.

Female. Face below antennae, cheeks and postorbital region of head, thorax, except the tegulae, hind coxae and apical two-thirds of abdomen deep metallic green with brassy and golden reflections; rest of face, the frons and narrow area on occiput next to the eye-margins dusky yellow; ocellar region of vertex and rest of occiput fuscous; antennae pale brownish yellow; eyes dark chestnut brown, and much brighter red in

life; tegulae and legs, except hind coxae, pure pale yellow, with the tip of the last joint of tarsi blackish; basal third of abdomen yellow, the metallic green sometimes extending narrowly along the sides to the base; wings hyaline, the veins very pale yellowish.

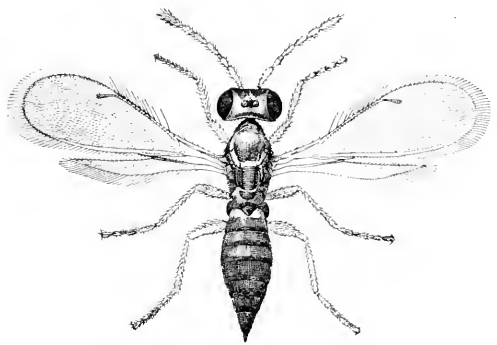


Fig. 1. *Ootetrastichus formosanus*, female.

More rarely the lower part of the face and the cheeks are yellowish, and in one specimen from Tainan, Formosa, the thorax is metallic bluish instead of green.

Head somewhat wider than the thorax, the face above antennae and the fronto-vertex collapsing after death; the cheeks a little over three-fourths as long as the eyes and about as wide as long; genal suture distinct, running from the base of the mandibles to the lower corner of the eyes, where it furcates, a branch following the eye-margin for a short distance in both directions; the postorbital area wide and forming with the postsutural part of the cheeks in side view of the head a broadly lenticular area, the inner margin of which is more convexly curved than the occipital margin; eyes about as wide as long, their outer margin oblique and slightly broadly emarginate, their upper exterior corners passing slightly over on to the occipital surface; vertex broad or as wide as the whole head at the lower corners of the eyes; ocelli in a very obtuse triangle, the posterior pair somewhat less removed from the eye-margins than from each other.

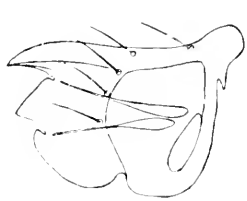


Fig. 2. Mandible of female *Ootetrastichus formosanus*.

Antennae inserted a little above the line connecting the lower corners of the eyes; scape reaching to the ocelli after shrinkage of the head, compressed and about three times as long as wide, excluding the radicle; pedicel nearly one-half as long as the scape and considerably wider at apex than the following joints; of the four ring-joints the first and fourth are longest, the first somewhat wedge-shaped and a little shorter on the inner side than the fourth, the second about one-fourth as long as the fourth and the third about one-half as long; first funicle joint nearly four times as long as thick and nearly equal to the next two joints combined, the second and third funicle joints equal in length but the third about a fourth thicker again than the second; club oval, slightly longer than the last two funicle joints combined and nearly a half wider again than the preceding joint, its apical joint about a third longer again than the basal joint and with a short, bluntly pointed nipple at apex. Funicle and club with numerous stout long bristles, better developed distad, the scape and pedicel with a few smaller bristles; the bristles in a transverse row near apical margin of the first joint of club, those in a similar row at the middle of the apical joint and several scattered near apices of the last two funicle joints considerably stouter than the other bristles and much enlarged at base; most of the bristles nearly or quite straight, but others, especially the shorter bristles near apex of the club, rather strongly curved inward.

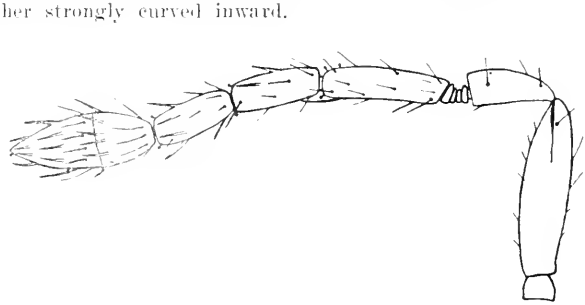


Fig. 3. Antenna of female *Ootetrastichus formosanus*.

Pronotum with a row of fine hairs along its posterior margin and a second row just anteriorly consisting of about three fine hairs on each side; mesoscutum with two or three pairs of hairs on each side near the outer margin, the pair just in front of the posterior corners slightly longer; the parapsides each with a single bristle-like hair near the posterior margin; sulci of scutellum very distinct, the submedian pair parallel; two pairs of converging blackish bristles present on the scutellum just outside of the submedian sulci; the anterior pair just behind the middle and the other pair near the apex.

Wings when closed reaching slightly beyond apex of the ovipositor; front pair rather wide, very broadly rounded at apex, the marginal cilia

longest on the posterior margin at a point about three-fourths of the distance from the base to apex, and even here considerably shorter than the stigmal vein; marginal vein more than twice as long as the submarginal and provided with about eleven or twelve bristle-like hairs which are rather longer than the cilia on the posterior margin, the submarginal with two bristle-like hairs; costal cell narrow and bare excepting two or three fine cilia near its apex, which are like the other discal cilia. Hind wings narrow, the cilia on the posterior margin nearly as long as the greatest width of the disk, those on the anterior margin not more than one-fifth as long; discal ciliation distinct except in the basal area opposite the submarginal vein.

Abdomen about a fourth longer again than the head and thorax combined, the ovipositor sheaths slightly protruded, rather stout and tapering to apex; sides of abdomen and apical fourth of the dorsum set with fairly numerous pale-colored hairs, the vibrissal plates of the last segment each with one long black seta directed obliquely outward.

Cheeks very finely lineolate-reticulate, occiput microscopically reticulate, the fronto-vertex and face more alutaceous; mesoscutum and scutellum more finely longitudinally lineolate than the cheeks, some of the microscopic impressed lines interlacing; scutellum with a minute round osteole on each submedian lobe situated about half way between the bristles and somewhat larger than the osteoles in which the bristles themselves are set; these are hardly visible in dry material, but prominent in slide mounts; parapsides and axillae more coarsely sculptured than the cheeks, the former reticulate, the latter lineolate; pronotum much more roughly sculptured than other parts of the thorax, the reticulations, however, hardly coarser than those of the parapsides, metanotum nearly smooth and polished, the propodeum comparatively coarsely but delicately reticulate, and with a median carina furcating in front of the apical neck, the branches extending outward to the sides; abdomen a little more coarsely reticulate than the propodeum.

Length of body: (0.94 to) 1.53; width of mesoscutum: 0.306; length of abdomen: 0.836; length and width of forewings: 1.24 by 0.428; length and width of hindwings: 1.01 by 0.153; length and width of scape excluding radicle: 0.169 by 0.056; length of pedicel: 0.087; length of flagellum: 0.436; length of first funicle joint: 0.122; length of club: 0.143 mm.

Male: Coloration considerably paler than in the female; head, tegulae, underparts of thorax, except metapleura, basal half of abdomen and legs pale yellow (about Naples yellow of Ridgway), the upper part of the occiput with a dusky spot and the vertex somewhat greenish around the ocelli; pronotum, anterior third of mesoscutum, parapsides, propodeum, metapleura, and apex of abdomen metallic green; remainder of the mesoscutum, axillae and scutellum greenish yellow and somewhat metallic in larger specimens with the apex and sides of the scutellum often decidedly metallic green, but in very small specimens all of these

parts are pale dusky yellow; metallic green of abdomen confined to the three apical segments shading into piceous on the two preceding segments and finally into the yellow of the basal half; antennae pale brownish yellow, the flagellum slightly darker; wings as in the female.

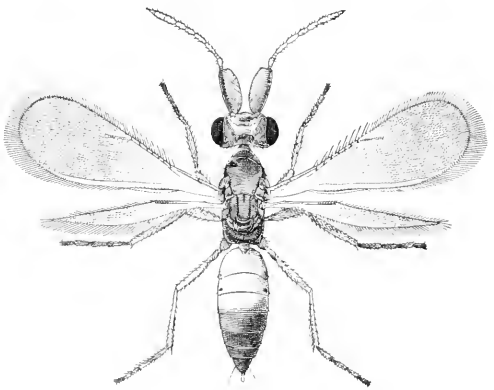


Fig. 4. *Ootetrastichus formosanus*, male.

Head somewhat similar in shape to that of female but softer and shrinking more after death; in life the upper part of the head is much thinner fronto-occipitally than in the female, the frontovertex convexly protuberant and very much wider than long, its anterior margin as seen from above somewhat concave between the eyes and separated by a sharp angle from the face; ocelli nearly in a straight line, the anterior one being but slightly advanced in front of the lateral pair and close to the angle bounding the upper limits of the face so that the frons is practically absent, the lateral ocelli about equidistant from each other and the nearest eye-margin; eyes considerably less than one-half as large as in the female but nearly of the same shape; cheeks rather longer than the diameter of the eye, nearly as wide as long as seen from the side; face convex below the antennae and hollowed out above them to form a large common scrobe.

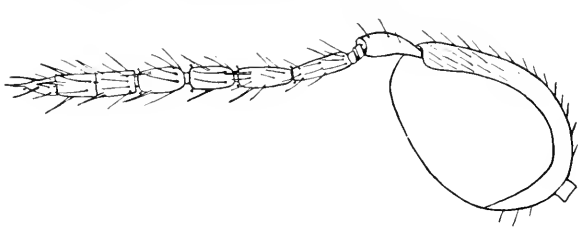


Fig. 5. Antenna of male *Ootetrastichus formosanus*.

Antennae inserted somewhat above the middle of the face as seen in frontal view of head or a little above the lower corners of the eyes; scape enormously expanded beneath, strongly convex on the inner face and concave on the outer; pedicel nearly ovate in outline, about equal to the first funicle joint in length and twice as wide; flagellum slender and cylindrical; the second of the three ring-joints shortest, the third longest, or about twice as long as the first and somewhat longer on its inner side, the first joint about a fourth longer again than the second; first funicle joint about a fourth longer than the second and a third longer than either the third or fourth joint, the latter somewhat thicker than the preceding joints; club about as long as the last three funicle joints combined and hardly wider, the first two joints subequal and somewhat shorter than the third, which is triangular in outline with a long cylindrical nipple fully one-half as long as the basal part of the joint. Bristles on antennae nearly as in the female, but those on the scape and pedicel hardly weaker than the smaller ones on the funicle; these with enlarged base occur near apex of the last two funicle joints and on the first two joints of the club.

Thorax nearly as in the female, the submedian sulci of scutellum slightly diverging behind; wings and legs as in the female, the front tarsi not modified. Abdomen hardly longer than the head and thorax combined, its sides parallel and the apex much less acutely pointed than in the female. Sculpture similar to that of the female but rather finer and more delicate, the inner or dorsal surface of the scape minutely and alutaceously roughened.

Length of body: (0.80 to) 1.13; width of mesoscutum: 0.261; length of abdomen 0.563; length and width of forewing: 1.02 by 0.327; length and width of hindwing: 0.853 by 0.106; length and width of scape excluding radicle: 0.259 by 0.181; length of pedicel: 0.089; length of flagellum: 0.438 mm.

Described from the following Hawaiian material all from the eggs of *Perkinsiella saccharicida* Kirkaldy: Ten females, three males, reared October 11-17, 1918, Mt. View, Hawaii *(Swezey)*, (holotype female, allotype and paratypes); one female reared February 14, 1918, from same locality *(Swezey)*, (paratype); five females, eight males reared March 19-21, 1919, Hilo Sugar Co., Hawaii *(Swezey)*, (paratypes); one male reared February 19, 1918, Waipio, Oahu, (paratype); one female reared July 5, 1918, Paauhau, Hawaii *(Williams)*, (paratype); one female reared July 8, 1918, Honokaa, Hawaii *(Williams)*, (paratype); one female reared June 26, 1918, Koloa Gap, Kauai *(Timberlake)*, (paratype); 59 females, 17 males, from breeding cages, Honolulu, during 1916 and 1917

(Timberlake), (paratypes); seven females, eight males reared from material collected March 24, 1920, Honolulu Plantation, Oahu *(Swezey)*, (paratypes). Also from the following Formosa material, from eggs of *Perkinsiella saccharicida* and possibly of other Delphacidae on sugar cane: two females, one male reared March 13-28, 1916, Tainan, Formosa *(Muir)*, (paratypes); and one female, one male reared December 7, 1916, Tainan, Formosa *(H. Sauter)*, (paratypes).

Types and paratypes in the collection of the Hawaiian Sugar Planters' Experiment Station, No. 1003, paratypes in the author's collection.

On Some Samoan Fulgorids (Homoptera).

BY F. MUIR.

Hawaiian entomologists have always been interested in the insect fauna of the Samoan archipelago, especially since Dr. Perkins described a species of *Proterhinus* * from there. As none of the Hawaiian entomologists could arrange to visit Samoa, Mr. W. M. Giffard did the next best thing—he interested a resident of Pago Pago in insects and persuaded him to collect.

In the latter part of 1917 Mr. Giffard, through his friend, Captain J. H. Trask of the S. S. Sonoma, started a correspondence with Captain J. M. Poyer of the U. S. N. who at that time was Governor of American Samoa. Governor Poyer referred him to Dr. H. C. Kellers, U. S. N., then stationed in Tutuila. This was a very fortunate choice as Dr. Kellers, although professing to be no entomologist, got together a very interesting collection which, in some of the groups of smaller insects, has given us our first good idea of what is present in the islands of Tutuila and Niüe. This good result is also partly due to Mr. Giffard's advice as to what to look for and to the collecting apparatus that he forwarded to Dr.

* Pro. Haw. Ent. Soc. I, 3, p. 88, July, 1907.

Kellers. Hawaiian entomologists must, therefore, thank Governor Poyer, Dr. Kellers, and Mr. Giffard for our increased knowledge of Samoan insects. I must also mention Captains Trask and Dawson of the Oceanic S. S. Coy, who kindly took charge of packages and saw to their safe delivery.

The length of time it has taken to work out this collection is due first to the war, which turned the attention of so many scientific men to work immediately connected with the war, and then to the difficulty of getting specialists to work up some of the groups. At present some are in the hands of specialists and we hope the remainder will shortly be attended to.

The present paper deals only with the fulgorids and gives us some idea of that group in the islands of Tutuila and Niüe for the first time. It consists of twenty-six species distributed in nineteen genera and seven families, viz:

Cixiidae, five genera, six species.
Delphacidae, six genera, nine species.
Achilidae, one genus, two species.
Ricaniidae, one genus, two species.
Derbidae, two genera, two species.
Tropiduchidae, two genera, two species.
Issidae, two genera, three species.

When we compare these with Hawaiian fulgorids a distinct difference is at once seen. Not a single genus is common to both regions, with the exception of the introduced *Perkinsiella*, and in this instance the species are distinct. Hawaii has only two families represented, Cixiidae by two genera and a few species and Delphacidae with numerous species, and several genera belonging to a tribe not present in Samoa. Turning to the Cicadoidea we find a still greater difference, as Samoa has representatives of Cicadidae, Cercopidae and Cicadellidae, whereas Hawaii has only representatives of Cicadellidae.

This strongly indicates that there has been no land connection between these two archipelagoes, since they received their fulgorid fauna which, judging by the antiquity of the suborder to which they belong, must have been from about the time of their first appearance on dry land bearing vegetation.

When we compare the Samoan with the Fijian fulgorids a strong relationship is revealed. So far as we know at present the Samoan fulgorid fauna is a poor representation of the Fijian, which in turn is a poor representation of the Malayan and Philippine.

Hitherto the Malay Archipelago has been considered with little reference to the Philippines, but as the latter is the richest part of the Malays, so far as insects are concerned, it will be necessary in future to reconsider many conclusions as to dispersal in the light of recent work in the Philippines. It is to be hoped that the outlying islands of the Polynesian plateau will be thoroughly worked in the near future so that we may be able to trace the line of migration of many of these insects.

Samoa, judging by the fulgorids of Tutuila, is an outpost of the Polynesian plateau and derived its fulgorids from that region. It is not necessary to join it up to that region by land to account for their presence, as I think they could have arrived by natural means of transport across a moderately wide expanse of water. In some cases, such as *Perkinsiella* in Niüe, man may have been the agency.

The genitalia of most of the families of Fulgoroidea have not been studied, or only in a very superficial manner. I believe that detailed studies will lead to a better understanding of the relationship of the families. Some interesting forms are found among this small collection revealing complexities quite unexpected.

The types have all been deposited in the collection of the Hawaiian Sugar Planters' Experiment Station, Honolulu, and numbered with the type number of that collection. The measurements are from apex of vertex to apex of abdomen and from the base to apex of one tegmen.

Cixiidae.

Myndus roggeweini sp. n. Fig. 6.

Male. Length 2.8 mm., tegmen 3.4 mm. Vertex considerably longer than width at base, which is broader than apex; a faint transverse carina about middle; length of face equal to width, widest at apical third; median ocellus distinct.

The genitalia are asymmetrical; the anal tube is large and broad, on the left side it is produced into a large, blunt spine, the right side is expanded with two small projections on its edge; the pygofer on medio-ventral edge produced into an acutely angular process, the left margin slightly curved, the right produced into a flat, quadrate process about the middle; genital styles flattened, angular, narrowest at base, apex truncate; penis long, jointed near apex, which is membraneous, with functional orifice at apex, the penis is surrounded by a long, tubular sheath with two small spines at apex and a long spine at base.

Stramineous, slightly darker over mesothorax. Tegmina hyaline, slightly stramineous, veins same color, tubercles numerous, small, bearing light macrotrichia; apical veins tinged with brown, especially at apices, cross veins also brownish; wings hyaline, veins yellowish.

Female. Length 3 mm., tegmen 3.4 mm. Similar to male. The ovipositor brown.

Described from four males and three females from Tutuila, Samoa, from 750 to 1200 feet elevation. (*Kellers*, April to December, 1918.) Type No. 1004. Named after the navigator who is credited with having been the first European to see the Samoan islands and named them Bauman Islands.

Leirioessa lamononi sp. n.

Male. Length 2.8 mm., tegmen 4 mm. Typical of the genus and closely related to the genotype, *L. tortricomorpha* Kirk. Head, pronotum and mesonotum brown, apex of clypeus and legs lighter, abdomen slightly darker. Tegmina light brown, a dark mark from base of costal cell to middle of clavai margin, where it is darker; a broader band from middle of costa across tegmen to apex of clavus, the margins being darker, a small dark mark at stigma, another on hind margin slightly beyond clavus, a dark mark across apical radial and apical median cells; veins same color as membrane, tubercles minute, brown; wings fuscous with darker veins.

Ventral edge of pygofer emarginate with an acute angular projection in the middle; anal segment long, apex obtusely pointed, lateral margins deflexed and inflexed, anus about one-third from apex; genital styles flat, narrow at base gradually widening to rounded apex, angular at apical third.

Female. Length 3.8 mm., tegmen 5 mm. In color slighly darker than the male. In this genus the abdominal sternites are not V-shape but transverse, the base of the ovipositor being near the apex of abdomen and projecting well beyond.

Described from one male and two females from Tutuila, Samoa, 700 to 1200 feet elevation. (*Kellers*, April, June,

July, 1918.) Type No. 1005. I name this species after the ill-fated naturalist of the Astrolabe who lost his life at Tutuila in 1788.

Austroloma baumanensis sp. n. Figs. 7, 7a.

Male. Length 2.6 mm., tegmen 3.8 mm. In the tegmina M3+4 bent at nearly right angle, forcing the apical portions of Cu1 and Cu1a * together.

Medio-ventral edge of pygofer produced into a small process, lateral edges roundly produced; anal segment short and broad, apex slightly rounded, broad, with a short, angular projection near each corner, anus slightly distad of middle; genital styles flat, slightly curved, slightly broadest at apex, which is subtruncate and slightly oblique; aedeagus large and complex, basal two-thirds tubular, flexed at one-third from apex, a small spine just basad of the joint, apex with a strong, curved spine at the apex of which the functional orifice appears to be situated; basad of this there is a membraneous lobe on each side.

Light brown, outer angles of mesothorax laterad of outer carinae dark brown; a series of small, brown spots on temples and sides of clypeus; legs with small brown bands; abdomen yellow or light brown, pygofer dark. Tegmina hyaline, fuscous at base, in middle of clavus, from stigma to middle of tegmen, over cross veins spreading out to apex; veins mostly lighter with brown tubercles.

Female. Length 2.7 mm., tegmen 4.2 mm. Ovipositor not projecting beyond apex of abdomen; inclined to be darker than the males, especially the abdomen, which is brown.

Described from twenty-six males and thirty-seven females from Tutuila, from 700 to 1200 feet elevation. (*Kellers*, April to December, 1918.) Type No. 1006. This insect is named after the islands called Bauman islands by Roggewein in 1721, and supposed to be the same as the Samoan islands.

Austroloma wilkesi. sp. n. Fig. 16.

This species differs from *A. baumanensis* in being uniformly light brown with no dark marks on legs, few or no dark tubercles on tegmina and the lateral portions of mesonotum not darker than middle.

The male genitalia are very distinct. There is no projection from the edge of the anal segment and the genital styles are not quite so curved. From the apex arises on the right side a long, sinuate process nearly as long as the aedeagus, from the left side of apex a thin, wider process with a small spine near base and a larger one about

* I agree with Tillyard in considering Cu2 as forming the clavel suture.

the middle; a spine arises about the middle of the aedeagus. Length of male 2.3 mm.; tegmen 3.3 mm. Length of female 2.8 mm., tegmen 3.5 mm.

Described from two males and two females from Tutuila, Samoa, from 760 to 1200 feet elevation. (*Kellers*, April and December, 1918.) Type No. 1007. This insect is named after the navigator who first surveyed the Samoan islands. There are six specimens of females which I placed in this species but have not considered as paratypes. They are darker with more or less black tubercles on the tegmina.

Urvillea dumonti sp. n.

This genus hitherto has been represented only by one species from Fiji. This species from Samoa is quite typical but specifically distinct.

Male. Length 2.7 mm., tegmen 4.8 mm. Vertex and face dark brown with carinae light, pronotum light brown, darker on lateral portions, mesothorax and abdomen dark brown, legs light. Tegmina hyaline, the apical cells and portion of subapical cells infuscate, veins yellow, tubercles minute bearing fine, light macrotrichia; wings hyaline, apical area fuscous, veins dark.

Anal segment large, flattened horizontally, anus at apex; pygofer long ventrally, short dorsally, considerably flattened horizontally, medioventral edge produced into a small, angular process, lateral margins roundly produced; genital styles small, flat, apex truncate, oblique, outer margin slightly concave, inner margin convex slightly sinuate; aedeagus complex but not dissected out.

Described from one male specimen from Tutuila, Samoa (*Kellers*, June, 1918), from 1200 feet elevation. Type No. 1008. This genus and species is named after Dumont d'Urville who explored the Pacific in the Astrolabe.

Meenoplus Fieb.

I have not been able to procure specimens of *Meenoplus albosignatus* Fieb., the type of the genus, but Fieber's figures and descriptions are excellent and leave little to be desired. The only difference that I can find between *Nisia* Mel. and this genus is the absence of an apical vein (M2). The claval veins may join together slightly basad in *Nisia* and Fieber shows a small vein from the second claval to hind margin which does not exist in *Nisia*. But these differences do not

warrant a generic separation in my opinion. It is no uncommon thing to find the apical veins differing on each tegmen of a specimen.

The group of genera to which this genus belongs forms a distinct division of the Cixiidae and could form a subfamily, Meenoplinae. The following nine genera, perhaps with some others, would come into the subfamily: *Meenoplus* Fieb., *Anigrus* Stal, *Nisia* Mel., *Phaconeura* Kirk., *Suva* Kirk., *Eponisia* Mats., *Paranisia* Mats., *Inawala* Dist., *Paranigrus* Bergr.

Dr. E. Bergroth * has recently written on this group and it is hoped that in the near future he will give us a critical survey of the genera composing it.

My interpretation of the venation of some of these genera is shown in figures 2 and 3. In *N. atrovenosus* (Leth.) from Ceylon M2 is missing, M3 and Cu1 are fused for some distance. Cu1a is strongly angled near the base and there are two cross-veins, one of which is diagonal. *M. albosignatus* Fieb. appears to be similar but for the presence of M2. The first claval and the Sc + R are granulate. *Paranisia* is similar to *Nisia* in venation and *Eponisia* to *Meenoplus*. *Suva* differs from *Meenoplus* in having junction of M3 and Cu1 nearer the base of the former. *Phaconeura* agrees with *Suva* with the exception that M3 and Cu1 remain together to the margin of tegmen in the type species, but in *P. laratica* Muir they part company before the apex. In some specimens, including the type of this last species, there are three apical veins to the radius. It is to be hoped that the tracheation of these tegmina will be worked out in the nymph.

Meenoplus langlei sp. n. Fig. 3, 3a.

Male. Length 1.7 mm.; tegmen 3.4 mm. M2 present, Cu1 touching M3 at its base then free, one cross vein between Cu1 and Cu1a, granulate along Sc + R and A1 (first claval), A1 and A2 meeting near apex of clavus. Anal segment short, curved, apex produced into two rounded processes; aedeagus fairly long, curved; genital styles long, thin, curved inward, their apices meeting on middle line, apices slightly

* Arkiv. for Zoologi. K. Svenska Vetensk. 12, 17 (1920).

expanded. Uniformly light yellow; tegmina hyaline, slightly white and opaque with waxy secretion, veins light yellow; wings hyaline, opaquely white with waxy secretion, veins yellowish.

Female. Length 1.7 mm.; tegmen 3.4 mm. Pregenital plate wider than long, quadrate, slightly emarginate apically; styles fairly large, projecting beyond the small anal segment. Color as in male.

Described from two males and one female from Tutuila, from 1000 to 2000 feet elevation (*Kellers*, April and September, 1918). Type No. 1009. This might easily be placed in a new genus judging by the venation, but I prefer to place it in *Meenoplus* until the group is revised. The species is named after the ill-fated De Langle of the Astrolabe, who was killed at Tutuila in 1788.

Nisia atrovenosa has been reported from such widely separated places as Madagascar, India and Australia, but an examination of the genitalia of specimens from Formosa and Australia shows specific differences. It is, therefore, possible that there are several species standing under this name. I have no males from Ceylon, so cannot say which are the typical genitalia.

ACHILIDAE.

Eurynomeus granulatus sp. n. Figs. 1, a, b, c, d.

This species conforms to the generic type with the exception that there are four branches to the media, and in some specimens the first branch is furcate at apex, making five apical median veins.

Male. Length 4 mm., tegmen 4.5 mm. Cinnamon, buff or clay color, darker over mesonotum. Tegmina thickly covered with light granules, most numerous basad of cross veins, darker bands across tegmina, one from costa to middle of hind margin of clavus, another from costa to apex of clavus and a very light one over cross veins; these bands fade out on some specimens; wings dark fuscous with dark brown veins.

The male genitalia of Achilidae are complex and have never been adequately described so far as I am aware. The pygofer of this species is comparatively short dorsally and laterally, but longer ventrally where the median portion of the hind margin is produced into two flat, pointed processes. The lateral edges being slightly emarginate; the anal segment is flat, broadly rotundate with the apex emarginate, anus distad of middle, anal style subovate; genital styles large, narrowest at base, broadest at apex where the upper or outer angle is produced, curved, and turned inward as two small points, another inwardly curved point nearer the middle, the inner angle roundly produced, the outer margin is thickened and from near the middle rises a long, curved,

strong, spine. The aedeagus is complex and consists of two parts forming more or less complete tubes. The inner tube is composed of a pair of flat, narrow processes, rounded at their apices and joined together at their bases where, in conjunction with a membrane, they form a tube into which the ejaculatory duct opens; a chitinous process proceeds from the base of this organ to the bases of the genital styles and co-ordinates their movements. The outer tube is composed of three pairs of processes joined together at their bases; the dorsal pair are pointed and bear small teeth along their dorsal surface. The lateral pair are larger, produced into a triangular spine at their bases, the distal portion being narrow, slightly sinuate and the apices rounded; the ventral pair are bifurcate, one portion projecting distad as a strong spine and the other curving under and inward as a strong spine. A strong, chitinous framework connects this outer tube to the base of the anal segment.

Female. Length 4 mm.; tegmen 5 mm. The eighth sternite is divided in the middle, the inner rounded edges meeting together, the seventh sternite is widely and roundly emarginate on the posterior margin. In coloration similar to the male.

Described from eight males and six females from Tutuila, Samoa, from 760 to 1200 feet elevation (*Kellers*, April, June, August, 1918). Type No. 1010. There are two other female specimens, larger and darker, which may represent another species.

Eurynomeus niger sp. n.

This is congeneric with the above and has the same venation. Length 4.2 mm., tegmen 5 mm. Black; two small white marks at base of clypeus continued onto genae and on lateral margin of pronotum, legs dark brown, hind legs lighter. Tegmina black, a whitish mark across the middle of clavus to costa near base, broadest in clavus, thinning out to a point on costa, this area being thickly granulate, a few light granulations scattered about; wings dark fuscous with darker veins.

Described from one female from Tutuila, Samoa, about 1000 feet elevation (*Kellers*, June, 1918). Type No. 1011.

Delphacidae.

Ugyops kellersi sp. n. Figs. 12, a.

Male. Macropterous; length 6 mm., tegmen 5.4 mm. Vertex longer than wide (1.4 to 1), apex slightly wider than base, base slightly in front of middle of eyes; length of face 2.3 times the width, widest slightly before apex, two median carinae obscure at base but distinct at apex; antennae longer than head and thorax together, second joint 1.8 times the length of first.

Anal segment large, more than half the length of the abdomen, steeply tectiform, narrowed to apex which is rounded, anus about one-third from apex. Pygofer long on ventral aspect, medio-ventral edge produced into two small processes with rounded and slightly expanded apices; lateral margins widely angular; genital styles narrow, flattened, outer surface slightly concave, sides subparallel, apex with outer angle produced and curved round, apex and inner angle curved over; aedeagus long, thin, subtubular, passing through a basal sheath tube, bent and jointed about the middle.

Apple green or dull green yellow, turning straminecus in old specimens, darker, or in some specimens red between the median frontal carinae; legs inclining to light brown, tarsi and apical portion of first and second tibiae darker; the second joint of antennae darker than first with the apical half darker than basal; abdominal tergites and dorsal portion of anal segment brown. Tegmina hyaline, slightly greenish or yellowish, veins slightly darker, tubercles very minute, same color as veins, bearing small dark macrotrichia; a dark fuscous mark over the first apical median cell; wings hyaline, slightly fuscous, veins dark.

Female. Macropterous; length 6.8 mm., tegmen 6 mm. Anal segment, long, tubular, concave along the ventral side. Anus at apex; ovipositor projecting beyond anal segment. In color similar to male.

Tutuila, Samoa, from 700 to 1200 feet elevation; Pago Pago, Samoa, 300 feet elevation. (*Kellers*, April to October, 1918.) Type No. 1012. Described from twenty-eight males and twenty-five females. There is also a small series of young of this or one of the other species.

Ugyops samoaensis sp. n. Fig. 10.

Male. Macropterous; length 4.2 mm., tegmen 3.5 mm. Length of vertex 1.2 times the width of apex, base considerably narrower than apex, carinae slightly projecting in middle of apex, continued on to the face separately; length of face 1.8 times the width, narrowest at base, widest on apical half, median carinae separate and distinct till near apex, where they converge together and become obscure; antennae reaching to apex of clypeus, second joint 1.7 times the length of first.

Pygofer long on ventral aspect, short on dorsal; medio-ventral edge deeply emarginate, the bottom of the emargination projecting as a lip with truncate apex, angles of emargination slightly produced beyond which the edge is slightly emarginate; anal segment large, slightly longer than broad, anus near apex; genital styles small, largest at base gradually decreasing to pointed apex, slightly curved and recurved; aedeagus long, characteristic of the genus.

Light brown; vertex and base of face mottled with dark brown, a dark mark across face about one-third from apex; antennae with two darker bands around second joint; front and middle tibiae banded with

two small dark bands; pronotum with darker mottlings. Tegmina hyaline, clear, veins of similar color broken by dark marks, tubercles small bearing dark macrotrichia; wings hyaline with darker veins.

Female. Macropterous; length 4.8 mm., tegmen 4.2 mm. Anal segment tubular, ventral surface grooved longitudinally, length twice the width, anus at apex, ovipositor reaching to apex of anal segment. Color similar to male.

Described from eleven males and ten females from Tutuila, Samoa, from sea level to 1200 feet elevation, and ten males and three females from Savage Island or Niüe. (*Kellers*, April to October, 1918.) Type No. 1013. The latter can be distinguished by the small projections at the angles of the emargination being larger than in the Tutuila specimens.

Ugyops bougainvillei sp. n. Fig. 9.

Male. Macropterous; length 5.7 mm., tegmen 5.4 mm. Length of vertex 1.4 times the width at apex, which is slightly wider than base and moderately rounded, base considerably before the middle of eyes; length of face 2.4 times the width, narrowest between eyes, broadest a little before apex, two median carinae distinct to apex; antennae reaching beyond apex of clypeus, second joint twice the length of the first.

Anal segment large, length about 2.5 times the width, tectiform, anus near apex; pygofer long ventrally, short dorsally, medio-ventral margin emarginate, produced in middle into two small processes, slightly flattened laterally and pointed at apex, sides widely angularly produced; genital styles subparallel sided, slightly curved and recurved, excavate on front surface, the apex at outer angle produced into a small square process turned at right angle to the body of style, the inner angle produced into two processes, the distal one the larger; aedeagus long, characteristic of the genus, the apical portion being longer than in *U. kellersi*.

Stramineous, second joint of antennae fuscous, the apical half distinctly so, a faint trace of red between median frontal carinae, fuscous along the hind margin of mesonotum. Tegmina hyaline, stramineous, veins slightly darker, black or fuscous over greater portion of subcosta, at base and before cross veins on radius and over the other veins to hind margin at these two points, fuscus at base of margin of clavus, apex fuscous, forming a small spot at apex of radial cell; tubercles small, bearing black macrotrichia; wings hyaline, veins brown.

Female. Macropterous; length 6.4 mm., tegmen 6 mm., ovipositor projecting slightly beyond anal segment. Darker than the male, the fuscous on veins of tegmina darker and more extensive.

Described from one male and three females from Tutuila, Samoa, from 1100 to 2141 feet elevation (*Kellers*, April to September, 1919). Type No. 1014. This species is named after the great navigator who gave the old world the first knowledge of Samoa.

Ugyops brevipennis sp. n. Fig. 11.

Male. Brachypterous; length 1.5 mm., tegmen 3.2 mm. Length of vertex equal to width, apex slightly wider than base, the two mediolateral carinae continuing on to the face separately, projecting beyond apex; length of face twice the width, broadest between antennae, sides slightly arcuate, two distinct median carinae; antennae reaching beyond apex of elypeus, second joint very slightly longer than first; tegmina reaching to middle of pygofer, cubitus forked near base, all others simple, clavai suture absent, hind margin of pronotum straight.

Anal segment large, length 1.4 times the width, ventral surface concave, anus about middle, apex broadly round; pygofer long ventrally, short dorsally, medio-ventral edge roundly emarginate, a small triangular projection at bottom of emargination and another at each corner with a small emargination beyond it; genital styles nearly straight, broadest at base, inner edge slightly concave, apices rounded; penis long and characteristic of genus.

Light brown, darker over carinae, along the hind margin of pronotum, base and apex of second joint of antennae, genae around antennae, coxae and abdomen. Tegmina dark brown, lighter over apical cross veins and adjoining veins, and from middle of clavus to basal portion of costal cell; veins prominent, apparently without tubercles and macrotrichia.

Female. Brachypterous; length 4.3 mm., tegmina 3.7 mm. Anal segment slightly longer than wide, tubular, slightly concave on ventral aspect, apex slightly emarginate, anus at apex; ovipositor projecting very slightly beyond anal segment. In color similar to male. There is a second female similar to the allotype except in size, viz., length 5.4 mm., tegmen 4.2 mm.

Described from one male from Tutuila, Samoa, elevation 1070 feet, and two females, the allotype from Tutuila, 300 feet and the other 1200 feet. (*Kellers*, April and June, 1918.) Type No. 1015.

Dicranotropis cognata Muir.

Four specimens from Pago Pago (*Kellers*, April, 1918). Previously known from Queensland, Fiji and Philippine Islands.

Phyllodinus koebelei (Kirk.).

Phacalastor koebelei Kirk. (1906) Bull. H. S. P. A., Ent. I, p. 408.

Dicranotropis koebelei (Kirk.) (1909) t. c. III, p. 134.

Twenty-eight brachypterous specimens, April, 1918, and one macropterous specimen, June, 1918 *(Kellers)*, from Tutuila, Samoa. The front legs of this species are distinctly flattened and slightly expanded and so must come into the composite genus *Phyllodinus* Van D. as it stands at present.

Perkinsiella vitiensis Kirk.

Five specimens from Savage Island (Niüe). *(Kellers*, August 6, 1918.)

Hitherto this species has only been known from Fiji. As this species is attached to sugar cane and this plant was carried by the natives in their early migrations, the distribution of the insect in the south Pacific would be of interest and might throw some light on the migration of the Polynesians. This applies to many insects attached to economic plants carried by the natives on their voyages.

Sardia pluto Kirk.

One specimen from Tutuila, Samoa. *(Kellers*, December, 1918), 1200 feet elevation. Previously known from Australia, Fiji, Formosa and Philippine Islands.

Megamelus proserpina Kirk.

One female specimen from Savage Island *(Kellers*, August 6, 1918). Previously known from Fiji, Amboina, Java and the Philippine Islands.

Derbidae.

Phaciocephalus tutuilae sp. n. Fig. 14.

Male. Length 3 mm., tegmen 4 mm. Very much like and closely allied to *P. vitiensis* Kirk.

Head, pronotum, tegulae and hind legs yellow, fuscous over apex of clypeus, mesothorax brown with the lateral angles lighter, front and middle legs fuscous, abdomen and genitalia brown, base of abdomen light.

Tegmina white with a longitudinal black mark starting from the

base of costa and ending at apex of R, covering half the radial cell longitudinally; posteriorly it is bounded by the clavai suture and apical portion of the cubitus, another black mark along the hind margin of clavus. The white portion opaque with waxy secretion. Wings hyaline, fuscous, with brown veins.

Medio-ventral edge of pygofer produced into a flat process longer than broad with the apex rounded, the process turns dorsad and lies between the bases of the styles, lateral margins of pygofer straight; anal segment long, broadest at apex where anus is situated, apex produced into two short, broad spines turned ventrad; genital styles spatulate, the inner margin near the base produced into a short, strong spine; on the outer margin a little more distad there is a slender, curved process with blunt apex. The apical margin near the inner corner is produced into a strong, flat spine turned inward; aedeagus large, jointed in middle, but not dissected out.

Female. Length 2.7 mm., tegmen 4.6 mm. Similar to male. Genitalia including the seventh sternite (subgenital plate) dark brown. The hind margin of the seventh sternite produced into a quadrate process, the base of which is slightly broader than apex and the apical corners rounded.

Described from two males and six females from Tutuila, Samoa (*Kellers*, April to August). Type No. 1016. This species is very near to *P. vitiensis*, which differs in having the spine on the apical margin of styles very small, the styles narrower and the apex of anal segment not produced into such curved points. The females of these two species appear to be alike.

Lamenia caligínea Stal. Figs. 13, 13a.

This species was originally described from Tahiti, but I have not seen specimens from that locality. The long series from Tutuila and Niüe (Savage Island) agree in all the characters described. I figure the male genitalia and the hind margin of the subgenital plate of female.

Ricaniidae.

Plestia kellersi sp. n. Fig. 4.

Male. Length 4.4 mm., tegmen 8 mm. In venation and structure this is typical of the genus.

Anal segment about as broad as long, lateral margin rounded, anus near apex; genital styles subparallel sided to near apex, flat, the apical inner corner rounded, the outer produced into a point, the style looking like the head of a bird with a large neck; aedeagus short and broad,

two curved spines arise from near the apex, one on each side, and curved over dorsal aspect; just basad of these there is a small process.

Light green or stramineous, darker in old specimens; abdomen darker green; pygofer, anal segment and styles brown; a round black spot at lateral margin of the pronotum beneath the eyes.

Tegmina hyaline, veins brown, costal membrane, costal cell, the very narrow subcostal and apical subcostal cells brown with a darker mark at apex of subcostal cell and base of R2 and R3, the apical margin fuscous to the apex of clavus; wings hyaline, veins dark, hind margin slightly fuscous.

Female. Length 5 mm., tegmen 9 mm. Similar to male. Pygofer and anal segment dark brown, ovipositor light.

Described from two males and three females from Tutuila, Samoa, elevation 1200 feet (*Kellers*, April to December, 1918). Type No. 1017. The two males have a small cross-vein at the base of R2—3, which is absent in the female specimens. This species differs from *P. marginata* Montr., by having no light spots in costal membrane and no color bands on head and thorax. The genital styles of *P. marginata* have the apices hammer shape, being more bluntly pointed on the outer corner of apex and considerably and roundly produced on inner corner.

Plestia anomala sp. n. Fig. 5.

Male. Length 3.7 mm., tegmen 7 mm. Female. Length 5 mm., tegmen 8 mm. The genital styles of this species are slightly narrower than *P. kellersi*, and the small process basad of the curved spine on the aedeagus is longer and thinner. In color and general build, it is the same as *P. kellersi*, except for one point in the venation of tegmina. In this species there is a submarginal row of cross-veins which is missing in *P. kellersi*, and the other two species of the genus. This character is enough to base a genus upon, according to the characters used in the family. But apart from this character the two species are so closely allied that I cannot agree in placing them in different genera.

It would be of great interest to study these two species and see if they interbreed and the result of interbreeding.

Described from two males and two females from Tutuila, Samoa (*Kellers*, April to December, 1918). Type No. 1018.

TROPIDUCHIDAE.

Vanua poyeri sp. n.

Male. Length 7.3 mm., tegmen 10.5 mm. Vertex slightly longer and more pointed at the apex and the face slightly longer and more pointed at the base, otherwise typical of the genus.

Male genitalia asymmetrical; pygofer deeply and angularly emarginate on ventral edge, lateral margins angularly produced, the right side more acutely, the left side with the angular production turned inward; anal segment symmetrical, large, long, fairly narrow, widened and rounded on apical half, apex rounded, anus about one-third from apex; only one median genital style, much longer than broad, sides subparallel, apex with slight emargination in middle, a large curved spine arises from left side about middle; penis long, slender cylindrical, with slender apex, jointed about one-fourth from apex, there is a membrane capable of expansion on apical third.

Light oriental green to straw color or light brown, in some specimens carinae slightly tinted with red; abdomen brownish. Tegmina and wings hyaline, veins light green, stramineous or light brown.

Female. Length 8.5 mm., tegmen 9.5 mm. Pregenital plate straight on hind margin with a semi-circular patch in middle of hind margin with a different texture to the rest of the sternite; anal segment semi-conical, the apex larger than base, ventral apical edge roundly produced. In color similar to male.

Described from eight males and seventeen females from Tutuila, elevation 900 to 1200 feet (*Kellers*, June, July, 1918). Type No. 1019. This species I have named after Captain J. M. Poyer, Governor of American Samoa.

Vanua angusta, sp. n. Fig. 15.

Male. Length 7 mm., tegmen 6.5 mm. Length of vertex slightly greater than width (1.2 to 1), widest just anterior of eyes, from where it narrows to a pointed apex; the face equally elongated and pointed at base, the diagonal carinae on face reaching to anterior margin of eye, as in the type species. In all other respects similar to genotype.

Genitalia asymmetrical; pygofer similar to *V. poyeri*, but the projection on right side flat, broad, bent at right angles and with slightly rounded apex, that on left side small, narrow with rounded apex, anal segment long, narrow, apex pointed with a large, curved spine beneath pointing basad, anus about one-third from apex; the single median genital style broad, subparallel sided, apex truncate with two small emarginations, a curved spine arises on left edge slightly apical of middle; penis long, cylindrical, with apex developed into a small, round process beset with small teeth and large, semi-membraneous process, broad at base and pointed at apex with two rows of small teeth.

Light green turning to straw color or light brown in older specimens. Tegmina and wings hyaline, veins green or yellowish brown.

Female. Length 7.5 mm., tegmen 7 mm. Pregenital plate with a semi-quadrate emargination on the hind margin, wider than deep; anal segment conical, short, anus at apex, ventral apical edge not much produced. Color similar to male.

Described from six males and six females from Niüe or Savage Island (*Kellers*, August 6, 1918). Type No. 1020.

This species is of interest because it stands between the type species and *Rhinodictya* Kirk. Melichar's tribe Peggiogini for those Tropiduchidae having elongated heads I think is a purely artificial one. *Vanua, Leptovanua* and *Rhinodictya* are closely allied, but *Peggioga* is nearer to *Numicia*.

The condition of the genital styles in this family is of interest. On some genera, i. e. *Ommatissus loufouensis* Muir, these organs are symmetrical and separate with their bases near together; the penis is surrounded by a ring from which projects a pair of long, slender processes nearly as long as the long, thin, tubular, penis. In *Tambinia formosa* Kirk. and allied genera the genital styles are symmetrical, but their bases are amalgamated so that they act as a single organ; the penis is partly surrounded by a sheath. In *Vanua* and allied genera the genital styles are joined together to the apex and form a single asymmetrical organ; the penis has no surrounding sheath or homalogous structure. We also find a corresponding modification of the tegmen. In *Ommatissus* the venation is simple and there is no costal area; in *Tambinia* the tegmen is broader, the venation more numerous and there is an indication of a costal area. In *Vanua* the tegmen is broad, there is a large costal area with cross-veins and the venation is much more numerous. This would indicate that the primitive type had a tegmen with a simple venation without costal area and a complex aedeagus with a penis surrounded by a more or less complex structure, and two genital styles which were symmetrical.

ISSIDAE.

Capelopterum maculifrons sp. n. Figs. 17, 17a.

Male. Length 4.3 mm., tegmen 4.8 mm. Vertex broader than long; face slightly longer than broad, inner carinae subparallel to outer, distinct, nearer to the outer carinae than to the middle of face, surface of face finely rugose.

Head and thorax straminеous or greenish, face speckled all over with small brown markings, clypeus brown over middle, pronotum with brown speckles, hind femora shiny brown, abdomen greenish, pygofer brown. Tegmina greenish brown with a hyaline patch across middle, the border of the hyaline patch being dark brown, whitish speckles in the cells, plainest on hyaline area; wings hyaline, slightly fuscous, veins brownish.

Genital styles slightly convex on inner edge, nearly straight on outer edge, broadest before middle, apex narrow, truncate, with the outer corner produced and slightly curved. Anal segment short, broad, in profile the ventral margin emarginate, apex rounded in middle, thus making five round projections, one apical and two on each side. The aedeagus is complex (fig. 17). It consists of a tube divided at the apex into two lobes (b) and having a small central lobe (a) on which the gonopore or opening of the ejaculatory duct is situated. Surrounding this is a large, complex organ forming a tube at the base and dividing into several free appendages at the apex. Ventrally there is a narrow projection (c) furcate at its apex, then a broader lobe divided into two (d) at its apex, these lobes bear a smaller projection at the side, from each side of the middle of this lobe, basad of the furcation, arises a long, slender, pointed process (e), still basad of these and near the base of *c* there is a semi-circular appendage (f) on each side, joined to the main body at its middle. From the dorsal side arises a broad plate divided into a pair of pointed lobes (g) and a median lobe (h). From near the point where the trifurcation takes place arises a pair of curved processes (i), and basad of these a pair of strong, pointed processes (k).

It is impossible to homologize these processes at the present time and useless to name them.

Female. Length 5 mm., tegmen 5.7 mm. In profile abdomen concave at base, convex and rounded at apex with the last visible tergite overlapping the greater portion of anal segment; anal segment curved to a point at apex; pregenital plate with hind margin sinuate in middle.

Color similar to male, but the hyaline spot and its border not so evident.

Described from fourteen males and six females from

Tutuila, from 900 to 1200 feet elevation (*Kellers*, April, June, July, 1918). Type No. 1021.

Capelopterum fuscifrons sp. n.

Male. Length 3.8 mm., tegmen 4.6 mm. Face longer than broad (1 to 1.3). Face and clypeus brown with a few light specks between outer carinae of face; vertex and nota light brown or stramineous speckled with brown, abdomen brownish; front and middle femora and tibiae brown, hind femora and basal half of tibiae brown. Tegmina similar to *C. maculifrons* but more brownish.

Genitalia on the same plan as *C. maculifrons* but with distinct differences. The fork at apex of *c* is longer, the large spines on *d* stouter, the apices of *d* more acute, the spine *i* sinuate and small at base and flattened at apex. The two species are closely related but specifically distinct.

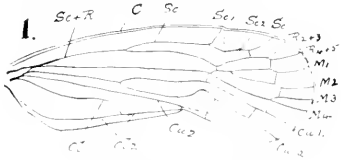
Female. Length 4 mm., tegmen 5 mm. Similar in color to male, but the hyaline spot and dark border very obscure.

Described from two males and two females from Niüe or Savage Island (*Kellers*, August, 1918). Type No. 1022.

PLATE X.

DESCRIPTION OF FIGURES.

1. *Eurynomeus granulatus*, right tegmen; 1*a*, aedeagus and anal segment, lateral view; 1*b*, male genitalia ventral view; 1*c* male genitalia dorsal view; 1*d* *penis*.
2. *Mecnoplus atrorenosus*, left tegmen.
3. *Mecnoplus langlei*, left tegmen; 3*a* male genitalia lateral view.
4. *Plestia kellersi*, male genitalia lateral view.
5. *Plestia anomala*, left tegmen; "*c*" costal vein; *c* costal margin.
6. *Myndus roggewcini*, male genitalia lateral view.
7. *Austroloma baumanensis*, left tegmen; 7*a* male genitalia lateral view.
8. *Neolollius viridis*, face; 8*a* vertex and pronotum.
9. *Uygops kellersi*, male genitalia ventral view.
10. *Uygops samoaensis*, male genitalia ventral view.
11. *Uygops brevipennis*, male genitalia ventral view.
12. *Uygops bougainvillei*, male genitalia ventral view.
13. *Lamenia caliginea*, male genitalia lateral view; 13*a* subgenital plate of female.
14. *Phaciocephalus tutuilae*, male genitalia lateral view.
15. *Vanua angusta*, male genitalia latero-ventral view.
16. *Austroloma wilkesi*, male genitalia lateral view.
17. *Capelopterum maculifrons*, aedeagus lateral view; 17*a* penis, lateral view.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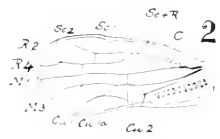
Sc+R
C
Sc
Sc1
Sc2
Sc
M1
M2
M3
Cu2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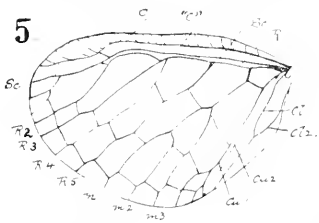
Sc+R
Sc2
Sc
C
R2
R4
M1
M3
Cu
Cu1a
Cu2


4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Sc
R
Cl
Cl2
R2
R3
R4
R5
m
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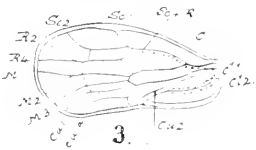
m3
Cu
Cu2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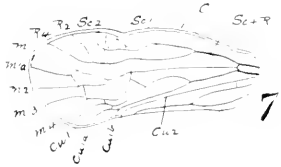
Sc
Sc+R
C
R2
R4
M
M2
M3
Cu2
3.

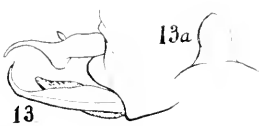

6.


R4
R2
Sc2
Sc1
C
Sc+R
m
m1
m2
m3
m4
Cu1
Cu2
7


9


8.


7a.


13
13a


8a.

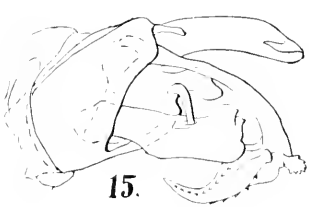

10.


1d


14.


12a

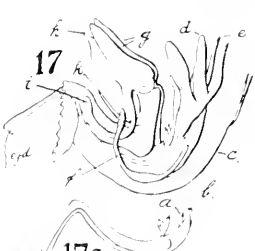

11


15.


3a


1a


12


17
k
g
d
e
i
h
c
b
a
17a


16.


1b.


1c.

Neolollius gen. n.

Vertex square, the length in middle equal to width, apex and base slightly concave; lateral carinae deep, those of apex and base small, a small line but no carina down the middle; the face between the mediolateral carinae projecting beyond the vertex; face narrowest at base, apical half roundly and broadly produced, side distinctly carinate, the inner carinae near to the outer but distinctly raised above them especially basally, face between inner carinae excavate, no median carina; antennae small, globose, eyes without antennal emargination; pronotum with two small depressions near the middle; abdomen compressed; hind tibiae with two spines. Venation as in *Lollius* Stal, the apical margins of the tegmina truncate. This genus is a modification of *Lollius*, the face is broader than long and in dorsal view there is a distinct break between the square vertex and the produced face.

Neolollius viridis sp. n. Figs. 8, 8a.

Male. Length 6 mm., tegmen 6.6 mm. Light green; head, pronotum and legs speckled with small, brownish marks, abdomen brownish below; tegmina with a few small, brown spots on hind margin and some faint whitish ones scattered over the cells.

Genital styles triangular, flattish, the acute apex turned in at right angles; anal segment narrow, concave on ventral side, apex rounded, anus about one-third from apex; aedeagus not dissected out.

Described from two males from Tutuila, 900 to 1200 feet elevation (*Kellers,* June 30, 1918). Type No. 1023.

So far as my present knowledge goes there is a distinction between the male genitalia of Flatidae, Ricaniidae and Issidae. In the Issidae the aedeagus consists of a large outer tube with or without complex appendages and a very small inner tube without any complex appendages, and a fairly large penis or lobe on which the gonopore is situated. In the Ricaniidae the outer tube is large and has no appendages, the inner tube small but with two large lateral appendages and the penis is small. In the Flatidae the outer tube is small with long appendages, the inner tube large without appendages, and the penis is small.

On the Curculionidae of the Samoan Islands (Coleoptera).

BY GUY A. K. MARSHALL, D. SC., C. M. G.

Through the kindness of Mr. F. Muir I have been able to examine a small but interesting series of Curculionidae from the collection of Mr. W. M. Giffard, taken by Dr. H. C. Kellers, of the United States Navy, on the small island of Tutuila in the Samoan Group. Very little appears to be known concerning the weevils of this group, and the only records I have been able to find are a few species described by L. Fairmaire, and a short paper by Dr. K. M. Heller on a small collection made by Dr. Rechinger in 1905.

It seemed, therefore, desirable to get together all the information that was available, and I have thus added descriptions of the Samoan weevils contained in the British Museum, which were mostly collected by the late Dr. H. Swale in 1916 and 1917.

There are four small species of uncertain generic position in Dr. Kellers' collection, which cannot be dealt with owing to the inadequacy or poor condition of the material; and Dr. Heller has recorded an undetermined species of *Diathetes*.

Subfamily Otiorhynchinae.

Sphaerorhinus puncticollis sp. n.

Color black, the elytra often partly or even wholly dark red-brown; the upper surface thinly clothed with extremely flat separated transparent scales, which appear as though they might be merely a sculpturing of the integument; in addition there are the following markings formed of small round greyish-white scales: a patch on the rostrum continuous with a small patch adjoining each eye; a narrow lateral stripe on the basal half of the prothorax; on the elytra, a variable short humeral row of about three small spots, in the middle of the disk a very irregular assemblage of small spots extending from stria 1 or 2 to 7, a narrow sutural stripe on the declivity, and a few minute spots near the apex. These markings are extremely variable, reaching their highest development in the females, and being mostly or entirely absent in the males.

Male. *Head* with coarse punctures that are usually more or less

confluent, the eyes moderately convex. *Rostrum* in profile shorter than the head; the declivous anterior portion as long as the dorsal basal part, broad, shiny and with scattered unequal punctures; the basal half with coarse punctures that are hidden by the scaling; the genae with rather long, obliquely raised, white setae. *Antennae* with the scape moderately curved, gradually clavate, and with sparse small round scales (often abraded) and subrecumbent white setae; the funicle with the joints all longer than broad, the order of relative length being: (1, 2), 3, (4, 5, 6, 7). *Prothorax* as long as broad, the sides rather strongly rounded, broadest at the middle, and narrower at the apex than at the base; the sides compressed near the base and with a short longitudinal fold above the compressed area; the whole surface set with coarse separated punctures, which become rather sparser and smaller near the apex, occasionally having a trace of a smooth median line in the basal half. *Elytra* ovate, jointly truncate at the base, the sides strongly rounded, broadest well before the middle, sharply pointed behind, but the outline scarcely sinuate before the apex; the dorsal outline moderately convex, not continuous with that of the prothorax, deepest at about one-third from the base, the posterior declivity comparatively gradual; there are ten rows of finely separated punctures, which are not striate except at the extreme lateral margins and sometimes near the apex, but behind the middle there are usually additional confused punctures between striae 7 and 9; the intervals between the rows are quite smooth and devoid of setae, except near the apex. *Legs* slender, sparsely set with short white setae. Length, 3.5-3.8 mm.; breadth, 1.6-2.2 mm.

Female. With the elytra much broader, the sides strongly sinuate before the apex, and the apex itself more produced and much more acute. Length, 4.8-5.5 mm.; breadth, 2.4-2.8 mm.

Habitat.—Tutuila Island; Center of Island, 700-1200 feet. VI-IX, 1918 *(Dr. H. C. Kellers)*.

Type (male) in the British Museum; cotypes in the collection of the Hawaiian Sugar Planters' Experiment Station. Described from twenty-three males and eleven females.

Allied to *Sphacrorhinus ("Sphacropterus") sericgranatus* Fairm., from Fiji, but that species differs *inter alia* in its longer rostrum, the declivous portion being shorter than the basal dorsal part; the forehead is striolate; the pronotum is granular between the punctures; the elytra are much less abruptly acuminate behind in the female, the punctures are larger and deeper, and the alternate intervals finely granulate.

Elytrurus samoensis sp. n.

Black, uniformly and densely clothed with pale sandy, dark grey or greenish grey scaling, often with a slight coppery reflection, especially on the legs.

Female. *Head* with shallow confluent punctures that are concealed by the scaling and a deep frontal fovea; eyes much flattened, oval. *Rostrum* a little longer than the head, strongly dilated from base to apex, the sides straight; the dorsal area also dilated from base to apex, confluently punctate and tricostate as far as the insertion of the antennae, the apical part shiny and sparsely punctate. *Antennae* red-brown, the scape rather sparsely setose and without true scales; the funicle with two basal joints equal, the remainder subequal *inter se*; the basal joint of the club as long as the next two together. *Prothorax* as long as its basal width, the sides subparallel from the base nearly to the middle and thence roundly narrowed to the apex; the dorsum gently sloping anteriorly, rather sparsely granulate on the disk but not at the sides, with a broad shallow longitudinal impression, with sometimes a trace of a low median carina. *Elytra* broadly ovate, widest before the middle and rapidly narrowing to a fairly sharp point; the dorsal outline moderately convex longitudinally and transversely, the posterior declivity sloping comparatively gradually to the apex; the dorsum without distinct striae, even when denuded, but irregularly set with minute flat inconspicuous granules; the lateral margins very sharply inflexed, thus forming a more or less obtuse lateral ridge, along which the granules are more noticeable; the inflexed margins with a few very distinct oblique striae and rows of granules. *Sternum* and venter densely clothed with narrow lanceolate scales and with sparse short obliquely raised setae. *Legs*: front coxae broadly impressed in front, the upper anterior margin roundly produced; the femora with sparse recumbent setae (mostly arising from small granules), those on the lower surface rather longer and obliquely raised; the front tibiae rather strongly incurved in the apical third, finely denticulate internally and there armed with a row of transparent spines; the hind tibiae almost straight and very feebly denticulate internally. Length, 12-14.25 mm.; breadth, 5.6-7.2 mm.

Habitat.—Samoan Islands. 1876 *(Rev. J. S. Whitmee)*.
Type in the British Museum.
Described from three females.

Elytrurus samoensis var. **setiventris** n.

Agrees entirely with the typical form, except that all the scales on the venter and those on the median part of the meso- and metasternum are setiform.

Habitat.—Tutuila Island: One female, 760-900 feet *(H. C. Kellers)*.

Type in the collection of the Hawaiian Sugar Planters' Experiment Station. Type No. 1028.

Described from a single female. Probably a local race.

Elytrurus bicolor sp. n.

Female. Color black, the upper sides of the prothorax and elytra clothed with green scales, with some buff ones intermixed; the remainder of the insect, including the scutellum, covered with dark buff scales, those on the head, rostrum, legs mostly having a coppery reflection.

Very similar structurally to *E. samoensis*, the description of which will apply to it, except in the following points: Scales on the upper surface larger and more nearly circular; the longitudinal impression on the pronotum much narrower, forming a more definite furrow and without any central carina, the granules flatter and more confluent; the sublateral ridge on the elytra distinctly sharper, the granules on the disk more conspicuous and forming more or less regular rows, and the setae on the extreme margin of the apical half noticeably longer; the intercoxal process of the mesosternum very deeply emarginate at apex (in *samoensis* it is almost straight or very slightly sinuate); the venter and the middle of the metasternum with narrow lanceolate scales, those on the former becoming gradually narrower posteriorly, so that on the last segment they are almost hair-like; the front tibiae rather more strongly curved and with longer denticulations. Length, 14.25 mm.; breadth, 7 mm.

Habitat.—Samoan Islands, 1875 (*Rev. J. S. Whitmee*).

Type in the British Museum.

Described from a single female.

Elytrurus bivittatus sp. n.

Male. Color black, with markings formed of brilliant pale green scales, the pronotum shiny, the head and elytra dull; the head with a large green spot just behind each eye; the prothorax with a broad green median stripe from base to apex, and a small green spot in the middle of the area on each side of it, the whole of the pleurae being densely clothed with golden scales, which are mingled with green ones along the upper edge; the scutellum with green scaling; each elytron with a single very broad stripe from the shoulder to the apex, lying mainly between striae 4 and 8; the lower surface densely clothed with narrow golden scales, except the base of the mesosternum and the portions of the metasternum lying between the mid and hind coxae, which are bare.

Head very finely and sparsely punctate, each puncture containing a short recumbent seta; the rostral costae encroaching somewhat on the forehead, which bears a deep central fovea. *Rostrum* strongly dilated from base to apex, the sides straight; the dorsal area aciculate, with fine sparse shallow punctures and slight inequalities, a very indefinite median costa, and a more shiny and sparsely punctate lateral costa on each side

curving inwards at the base in the direction of the frontal fovea. Antennae as in *E. samoensis* but proportionately longer. *Prothorax* a little longer than broad, almost parallel-sided from the base to the middle, then roundly narrowed to the apex; the dorsum gently convex longitudinally, with a broad shallow median furrow in the basal half, the shiny area on each side minutely punctate and with scattered rather large punctures, each bordered inwardly or anteriorly by a much flattened granule; most of the punctures bearing minute recumbent pale setae. *Elytra* narrowly ovate; rather sharply pointed behind and almost jointly rounded at the apex; the punctures in the rows separated by their own length or more and each with a depressed granule at its anterior edge; the punctures in the stripes not visible through the scaling, and the rows on the inflexed margins curved, irregular behind and not reaching the base; a large shallow oval impression close to the lateral margin not far from the base; the bare intervals adjoining the suture each with a row of small, much depressed, distant granules; on the broad inflexed margin of the elytra the median interval has a curved row of about 12-16 shiny granules, each bearing a stout upwardly directed red-brown spine, and below it another sparser row of similar but much smaller spines; the extreme lateral margin of the elytra with a fringe of projecting setae on the apical half. *Legs* coriaceous, with numerous low shiny granules (each bearing a stout recumbent seta) and thinly clothed with narrow blue-green scales; the hind femora with a large smooth oval impression on the inner face. *Venter* with the first ventrite very broadly and shallowly impressed. Length, 12 mm.; breadth, 5 mm.

Habitat.—Upolu Island. One male, Tafua Volcano, 1917 *(Dr. H. Savage)*.

Type in the British Museum.

A strikingly distinct species.

Subfamily Acicnemidinae.

Acicnemis foveicollis Heller.

A. foveicollis Heller, Denks. K. Ak. Wiss. Wien, LXXXIX: 695, 1913.

Habitat.—Savaii Island *(Dr. Rechinger)*; Upolu Island *(Dr. Rechinger)*; Tutuila Island, one male and one female, 760-1670 feet, IV and VI, 1918 *(Dr. H. C. Kellers)*. Tahiti; Tonga Islands; Wallis Island.

Genus **Trigonopterus** Fauvel (1862).

It is not clear whether Pascoe's genus *Idotasia* (1872) is really distinct from *Trigonopterus*, but certainly several species

that have been included in it are inseparable from the latter genus. Including the three new ones here described, six species of *Trigonopterus* are now known from the Samoan Islands, and they may be distinguished by the characters given in the following key:

1. (10). The apical portion of the elytra much produced backwards, the dorsal outline sloping gradually behind.

2. (5). Prothorax finely punctate above; elytra almost impunctate on the disk.

3. (4). Elytra with a transverse fascia at the base and an oblong fascia at the apex formed of snow-white hairs, and with two distinct lines of punctures at the lateral margin; sides of prothorax subparallel in the basal half.....*aeneonivcus* Frm.

4. (3). Elytra entirely without white markings and with only one lateral row of punctures; sides of prothorax convergent anteriorly throughout.....*submetallicus* sp. n.

5. (2). Prothorax coarsely punctate; elytra with regular rows of punctures throughout.

6. (7). Prothorax not constricted at the apex; 7th row of punctures on the elytra extending only from the apex to the middle. .....*bicolor* sp. n.

7. (6). Prothorax constricted at the apex; 7th row of punctures on the elytra extending nearly to the base.

8. (9). Elytra with all nine rows of punctures more or less striate, and with an elongate spot of white scales on each side at the apex.....*binotatus* sp. n.

9. (8). Elytra with only the 1st and 2nd and 9th rows of punctures striate, and without white spots.....*samoanus* Hell.

10. (1). The apical portion of the elytra not produced backwards, the dorsal outline abruptly declivous behind....*cribrellicollis* Frm.

Trigonopterus submetallicus sp. n.

Color uniform shiny black, purplish or bronze.

Male and female. *Head* with distinct separated punctures, which gradually disappear on the extreme vertex; the forehead with much coarser confluent punctures and short erect pale setae; a deep furrow along the upper margin of each eye. *Rostrum* (male) with three well-marked dorsal carinae extending nearly to the apex, and an additional carina on each side forming the upper edge of the scrobe; the surface set with short suberect white setae placed transversely, except at the base

where the setae are longer, scale-like and directed backwards; in the female the three dorsal carinae disappear behind the middle, the anterior half being bare and shiny, with a double median row of fine punctures and a deep lateral stria on each side. *Prothorax* a little broader than long, broadest at the base, with the sides almost straight and gradually narrowing for four-fifths of its length, then narrowing more rapidly to the apex, but not constricted; the dorsal apical margin very slightly arcuate, the basal margin without any transverse row of punctures; the dorsal punctures very fine and widely spaced, but becoming larger towards the front margin; laterally the punctures are very large and coarse in the front half, and fine and sparse behind. *Elytra* rather elongate (3:2), very slightly widening for a short distance behind the base and then rather rapidly narrowing to the apex, the sides being almost straight; the apex broadly subtruncate, with the external angles rounded; the surface practically impunctate except along the base, lateral margin and the apex, but sometimes with faint traces of rows of minute punctures; at the base a transverse row of large single punctures, which is continued along the lateral margin (but the punctures are here much smaller and shallow) and becomes a punctate stria at the apex; the whole apical area rugosely punctato-striate, each puncture containing a minute pale seta; dorsal outline continuous with that of the pronotum, deepest near the base, thence sloping (by no means steeply) to the apex. *Legs* sparsely clothed with short white setae, but no scales; femora not toothed, coarsely punctato-striate on the distal half, sparsely and finely punctate towards the base. Length, 3.25-4 mm.; breadth, 1.4-1.8 mm.

Habitat.—Tutuila Island: 1000 feet, VIII, 1918 *(Dr. H. C. Kellers)*.

Type in the British Museum; cotypes in the collection of the Hawaiian Sugar Planters' Experiment Station.

Described from nine males and three females.

Trigonopterus binotatus sp. n.

Head, prothorax and legs black; elytra, mesosternum and metasternum chestnut-brown, the base and apex of the elytra blackish; on each elytron a small elongate patch of dense white scales at the apex, lying between striae 3 and 6, and recumbent white setae in each of the punctures in the apical fourth of the external stria.

Male. *Head* with strong separated punctures, which are much larger and confluent on the forehead, which bears suberect white setae; a narrow furrow above each eye. *Rostrum* with three dorsal carinae extending for three-fourths of its length (the median one much broader than the other two) and a lateral carina forming the upper edge of the scrobe; the furrows betwen the carinae shallowly and confluently punctate, and the apical area with very large shallow punctures. *Prothorax* a little broader than long, with the sides subparallel for about one-third from the base,

then roundly narrowed and distinctly constricted at the apex; the dorsal apical margin truncate, the basal margin impressed and with a transverse row of punctures; the entire upper surface fairly evenly set with large deep separated punctures and without any smooth median line; laterally the punctures are larger and much more crowded in the anterior half, but very sparse in the smooth basal impression for the reception of the anterior femora. *Elytra* scarcely dilated behind the base and then rapidly narrowing to the broadly rounded apex, the sides being almost straight; the basal margin elevated, subtruncate, but curving slightly forwards at the external angles; the complete regular rows of deep spaced punctures all more or less shallowly striate, the spaces between the punctures being as long or longer than the punctures themselves, and a basal puncture in each row much larger than the rest; intervals 1, 2 and 5 each with a complete row of punctures, the other dorsal intervals with only a few punctures towards the base; the posterior declivity rather longer and less steep than in *T. submetallicus*. *Legs* clothed with rather stout white setae, and the posterior pairs of femora with a row of elongate white scales along the dorsal edge; the femora not toothed, with irregular rows of deep punctures from base to apex, the apical punctures much longer and more or less confluent. Length, 4 mm.; breadth, 1.8 mm.

Habitat.—Tutuila Island: One male, 2141 feet, 22, IX, 1918 *(Dr. H. C. Kellers)*.

Type in the collection of the Hawaiian Sugar Planters' Experiment Station. Type No. 1029.

Trigonopterus bicolor sp. n.

Male and female. Color shining black, the elytra chestnut-brown, with the apex blackish; devoid of scaling or appreciable setae. *Head* impunctate on the vertex, closely punctate in front and confluently so on the forehead; a deep narrow furrow above the eye. *Rostrum* (male) with the usual five carinae extending almost to the apex, the three dorsal ones about equal in width, the apical area rather uneven but scarcely punctate; the setae inconspicuous, very short and recumbent; in the female the dorsal carinae cease behind the middle, the apical portion being strongly punctate, with a broad impunctate median stripe in its basal half. *Prothorax* almost as long as broad, gradually narrowed from base to apex, the sides gently rounded and not constricted at the apex; the basal margin impressed and with a transverse row of punctures, the apical dorsal margin distinctly arcuate; the whole upper surface with widely spread strong punctures, which are rather less dense towards the sides and base; the lateral punctures similar to those on the disk. *Elytra* elongate, the sides slightly rounded close to the base, then rapidly narrowed to the produced and broadly rounded apex; the basal margin truncate and slightly raised; the rows of punctures scarcely striate except towards the apex, rows of seven and eight uniting in the basal half to form

a single row of large punctures; the basal puncture in each row larger than the others, and in the male all the punctures in the basal half of the lateral rows are very much larger than those on the disk, but this is much less marked in the female; the dorsal intervals with single rows of very minute distinct punctures. *Legs* with sparse short white setae; the femora not toothed, the punctures dense and coarse on the apical half, but forming regular rows towards the base. Length, 2.8 mm.; breadth, 1.2 mm.

Habitat.—Tutuila Island: Three males and one female, 760-1200 feet, V and VI, 1918 *(Dr. H. C. Kellers)*.

Type in the British Museum; cotypes in the collection of the Hawaiian Sugar Planters' Experiment Station.

Trigonopterus samoanus (Heller).

Idotasia samoana Heller, Denks. K. Akad. Wiss. Wien, LXXXIX, 696, 1913.

Habitat.—Upolu Island; under bark of a dead tree, 1905 *(Dr. Rechinger)*; Tutuila Island: Eight males, 960-1200 feet, VI-VII, 1918 *(Dr. H. C. Kellers)*.

Trigonopterus aeneoniveus Frm.

Trigonopterus aeneoniveus Fairmaire, Le Naturaliste, 1879, p. 3; Ann. Soc. Ent. France, 1881, p. 315.

Habitat.—Samoan Islands. (Unknown to the writer.)

Trigonopterus cribrellicollis Frm.

Trigonopterus cribrellicollis Fairmaire, Ann. Soc. Ent. France, 1881, p. 316.

Habitat.—Samoan Islands.

The description suggests that this possibly is not a true *Trigonopterus*.

Orcchles's nigrofasciata sp. n.

Female. Color reddish brown, densely clothed above with light brown scaling variegated with whitish and blackish scales; the head with the scaling pale brown, rather darker on the forehead, and with a short median whitish stripe on the vertex; the pronotum with a very irregular and indefinite whitish median stripe, and a small blackish patch on each side of it at the base; the elytra with a few whitish scales round the scutellum, a small well-defined oblong white patch on interval 4 at one-third from base, a narrow oblique blackish band running from near the

suture at the top of the declivity forwards to stria 7 a little in front of the middle, and a few other scattered whitish and blackish scales; the prosternum with separated broad pale brown scales interspersed with narrow ones; the rest of the lower surface very thinly clothed with small setiform scales, each arising from a puncture.

Head with the forehead narrowing from the base of the rostrum to the top of the eyes, without any median fovea. *Rostrum* rather flattened dorso-ventrally, strongly narrowed from the base to the antennae and thence almost parallel-sided; the apical two-thirds bare, shiny and with sparse minute punctures; rather coarsely punctate at the base with a few pale scales. *Antennae* with the two basal joints of the funicle equal, the remainder transverse and becoming successively wider. *Prothorax* about twice as broad as long, parallel-sided for a short distance from the base, then rapidly narrowing to the well-marked apical constriction; the basal margin truncate, except for a small rounded projection in front of the scutellum; the dorsal apical margin strongly rounded; the dorsum even, the large close punctures mostly hidden by the scales, which are much larger than those on the elytra. *Scutellum* punctiform, bare, glabrous. *Elytra* not broader at the shoulders than at the base of the prothorax, the sides gently rounded, the base truncate and submarginate, the apices jointly and obtusely rounded; the shallow striae with large separated punctures that are not covered by the scaling, but become much smaller behind; striae 8, 9 and 10 (abbreviated) much deeper than the others; the dorsal intervals broad and even, each bearing a row of small recumbent scale-like setae that are not easily discernible; the dorsal outline not continuous with that of the thorax, but rising rather rapidly to about one-third from the base and sloping more gently to the apex. *Legs* without any angular tooth on the femora. *Sternum* with the metasternum between the mid and hind coxae as long as the mid coxa. Length, 3.2 mm.; breadth, 1.8 mm.

Habitat.—Upolu Island: One female, Tafua Volcano, 1917 *(Dr. H. Swale)*.

Type in the British Museum.

Closely allied to *O. solea* Pascoe (Jl. Linn. Soc. Lond., XI, 195, 1873), from Batchian, which, however, has two white spots on the front margin of the pronotum and two white spots on each elytron; the prothorax begins to narrow immediately from the base, is much more produced in front and is coarsely and reticulately punctate; the femora bear a very small angular tooth; the metasternum between the coxae is shorter than the mid coxa, etc.

SUBFAMILY CALANDRINAE.

Cosmopolites sordidus (Germ.).

Habitat.—Upolu Island *(Dr. H. Swale)*.

Rhabdocnemis obscura (Boisd.).

Habitat.—Upolu Island: under bark *(Dr. Rechinger)*; Tutuila *(Dr. H. C. Kellers)*.

Calandra oryzae L.

Habitat.—Upolu Island *(Dr. Rechinger)*.

Diocalandra taitensis (Guer.).

Habitat.—Tutuila Island: One female, center of island, 900-1200 feet *(Dr. H. C. Kellers)*.

SUBFAMILY COSSONINAE.

Genus **Glyphostethus** nov.

Head globular, deeply imbedded in the thorax; the eyes very shortly ovate, entirely lateral, coarsely facetted. *Rostrum* short and stout, only half as long as the prothorax, and quite straight, but directed downwards; the scrobes deep, widening behind and passing rapidly beneath the rostrum, but broadly separated at the base. *Antennae* inserted beyond the middle of the rostrum; the scape short and stout, not reaching the eye, widening from base to apex; the funicle with joint 1 a little longer and much broader than 2, 3 to 7 transverse and becoming successively wider; the club shortly oval, as long as the three preceding joints, the apical third spongy. *Prothorax* strongly and broadly constricted in front, with the apical dorsal margin so much produced that the head, when deflected, is invisible from above. *Scutellum* small, punctiform. *Elytra*, oblong-ovate, much broader at the shoulders than the prothorax, subtruncate at the base, and with stria 10 very short. *Legs* with the femora hardly clavate, unarmed; the tibiae straight, slightly compressed and strongly uncinate; the tarsi four-jointed, joint 3 not broader than 2, the claws free and simple. *Sternum:* the prosternum below the level of the metasternum, with a deep furrow in front of the coxae, the front margin very deeply sinuate, the coxae rather narrowly separated; the central piece of the mesosternum trapezoidal, narrowed behind, the front margin shallowly sinuate; the metasternum between the coxae rather longer than the mid coxa.

Genotype, Glyphostethus cancellatus sp. n.

The only known species presents a strong superficial resem-

blance to *Dryophthorus*, from which it differs in not having the prosternum in one plane, in its hood-like pronotum, small antennal club, short scape, short metasternum, and, above all, in its deep prosternal furrow and strongly sinuate gular margin, characters which I have not observed elsewhere in the Cossoninae.

Glyphostethus cancellatus sp. n.

Male. Color dull black, the foveae filled with light brown incrustation (possibly adventitious); the antennae and legs red-brown.

Head finely rugulose all over, and with a faint transverse depression across the forehead. *Rostrum* narrowed from the base to the middle and then gradually dilated to the apex; the upper surface distinctly rugulose, without furrows or carinae. *Prothorax* as long as broad, very convex with the sides gently rounded in the basal two-thirds, strongly and very broadly constricted at the apex, the whole apical area being depressed much below the level of the posterior portion; the basal margin truncate and depressed, the apical strongly and broadly rounded; the whole surface covered evenly with large reticulate foveae. *Elytra* parallel-sided from the shoulders to beyond the middle, sharply constricted before the apices, which are jointly and broadly rounded; the basal margin truncate in the middle as far as interval 4, and shallowly bisinuate between that and the shoulder; the broad shallow striae with regular rows of large reticulate foveae, the septa in the rows being as broad as the intervals between the rows; the intervals finely rugulose; a shallow impression behind the scutellum and a much deeper one on each side near the apex. Length, 3.25 mm.; breadth, 1.4 mm.

Habitat.—Upolu Island: One male, Apia, 1916 (*Dr. H. Swale*).

Type in the British Museum.

Pentarthrum cylindricum Woll.

Habitat.—Upolu Island: One female, Apia, 1916 (*Dr. H. Swale*).

This species is widely distributed throughout the Tropics.

Oxydema fusiforme Woll.

Habitat.—Upolu Island: Six males and eight females, Apia, 1916; one male, Tafua Volcano, 1917 (*Dr. H. Swale*).

This is another widely distributed species. Originally described from Ceylon, it occurs also in the Seychelles, Rodriguez, the Marquesas Islands and the Hawaiian Islands. Speci-

mens from the last-named locality have been described under the name of *Pseudolus hospes* Perkins.

Cossonus dentipes sp. n.

Male, female. Color shiny black, the apical half of the rostrum, the antennae and the legs reddish or yellowish brown, and the body with markings of the same color; the pronotum with a marking like the head of an inverted trident, its base resting on the subapical transverse furrow and the three prongs almost reaching the base of the pronotum, the median one being a little broader and better defined than the others; each elytron with a large oblong basal patch lying between stria 2 and the shoulder and varying from rather longer than to twice as long as broad, and a small ovate preapical patch lying between striae 1 and 3; the prosternum with the sides broadly and the front and hind margins narrowly black. The rest yellow-brown, a narrow pale band connecting the prosternal with the pronotal patch anteriorly; the rest of the sternum more or less suffused in the middle, and the venter along the margins, with red-brown.

Head with only a very few minute punctures on the vertex, which is separated from the forehead by a very shallow transverse impression; the forehead rather strongly and closely punctuate, with a deep central fovea. *Rostrum* half the length of the prothorax in the male, shorter in the female, subcompressed laterally in the basal half, strongly dilated and subquadrate in the apical half; the punctures rather finer and more sparse than those on the forehead. *Prothorax* about as long as broad, with the sides gently rounded, broadest behind the middle, strongly constricted near the apex, the constriction continued across the disk as a deep curved punctate furrow; the basal margin shallowly bisinuate, and just within it a deep transverse impression on each side of the middle line; the disk flattened, with two very irregular admedian rows of large punctures enclosing a smooth strip, the adjoining areas of the disk on each side with sparse punctures, those at the sides being much denser and coarser. *Elytra* oblong-ovate, parallel-sided from the shoulders to the middle; the shallow striae containing large separated punctures which are much diminished behind; the intervals almost flat, not narrower than the punctures, and bearing rows of extremely minute punctures. *Legs* with the front femora of the male armed with a stout tooth, those of the female simple. Length, 4 mm.; breadth, 1.2 mm.

Habitat.—Upolu Island: One male, one female, Apia, 1916 *(Dr. H. Swale)*.

Type in the British Museum.

I am not acquainted with any other Cossonine that has a tooth on the femora, and its occurrence as a sexual character is even more remarkable. The greater length of the rostrum

in the male is also a very unusual feature, though it occurs in the allied genus *Rhopalomesites.*

Cossonus limbaticollis sp. n.

Color shiny black, the apex of the rostrum, the antennae, legs and markings on the body red-brown; the pronotum with a broad ill-defined red-brown stripe on each side; the elytra each with a broad indefinite stripe from the base to the middle, lying between stria 2 and the shoulder at the base and gradually narrowing behind, and with a faint red-brown spot near the apex; the metasternum with a large red-brown patch on each side.

Head with the vertex not markedly separated off from the forehead; the latter with a deep central fovea and fine sparse punctures, those on the vertex even smaller and much more distinct. *Rostrum* less than half the length of the pronotum (2:5), quite cylindrical, slightly curved, and very finely and sparsely punctate. *Pronotum* as long as broad, with the sides gently rounded, broadest much behind the middle, scarcely constricted at the apex, and without any trace of a transverse furrow; the basal margin deeply bisinuate, and just within it a deep lunate impression on each side of the middle line; the disk not impressed, fairly evenly set with small widely-spaced punctures, leaving an ill-defined impunctate strip from the base to beyond the middle, the lateral punctures closer and slightly larger than those on the disk. *Elytra* suboblong, elongate, parallel-sided from the shoulders to beyond the middle, and more broadly rounded at the apex than usual; the striae shallow, especially towards the sides, with rather widely-spaced punctures, which become much smaller behind; stria 10 deep and strongly punctate from the base to the hind coxa, there ceasing abruptly and continued as a row of minute punctures for the length of the first ventrite, then increasing in size and merging into a common furrow with stria 9; the intervals a little broader than the striae, slightly convex, and almost impunctate. Length, 4 mm.; breadth, 1.25 mm.

Habitat.—Tutuila Island: One female, eastern end of island, 1070 feet *(Dr. H. C. Kellers).*

Type in the collection of the Hawaiian Sugar Planters' Experiment Station. Type No. 1030.

Stereoderus binodifrons sp. n.

Female. Color shiny black, with the sides and lower surface of the rostrum, the antennae, the tarsi and the apical margin of the venter red-brown.

Head minutely coriaceous, evenly set with fine distant punctures and with an indistinct median longitudinal depression; the forehead with a small raised area in the middle bearing two closely placed rounded granules. *Rostrum* very short, as usual, sculptured like the head, with

a small median granule near the base; the epistome asymmetrically bisinuate, the left sinus being broader than the right. *Prothorax* longer than broad, widest near the base, rapidly narrowed behind and gradually narrowed in front, very shallowly constricted near the apex, the constriction continued across the dorsum as a curved shallow impression; the basal margin impressed and punctate; the dorsum very evenly set with strong widely spaced punctures, except along a short median line that reaches neither base nor apex, the apical area much more finely punctate. *Elytra* with five shallow dorsal striae containing strong spaced punctures, the striae disappearing and the punctures becoming much smaller behind; beyond stria 5 four rows of small widely separated punctures, those in row 9 being much closer together than those in the other rows; row 10 striate and shallowly punctate, being bordered below by a continuous carina that extends from the shoulder nearly to the suture; the dorsal intervals each with an irregular row of very minute punctures. *Sternum:* mesepimeron impressed on its posterior half and with traces of shallow punctures along the anterior edge of the impression. Length, 6 mm.; breadth, 1.8 mm.

Habitat.—Upolu Island: One female *(Dr. H. Swale).*

Type in the British Museum.

Closely related to *S. pacificus* Woll., which differs in the following particulars: The forehead has only a single prominence; the punctures on the pronotum are much finer, and the subapical transverse impression is shallower and interrupted in the middle; on the elytra the punctures in rows 6-8 are not more spaced than those in 9, and stria 10 (with the carina below it) is broadly interrupted for the space corresponding to the first ventrite; the mesepimeron is not impressed and bears eight or nine strong punctures.

It may be noted that *Rhyncolus obsoletus* Fauvel, from New Caledonia, is really a *Stereoderus.*

Temnorhamphus samoanus sp. n.

Color entirely piceous, or with the prothorax and the suture of the elytra blackish.

Head closely and deeply punctate, with a small frontal fovea. *Rostrum* slightly longer than broad, punctured like the head, and with a broad shallow median furrow. *Antennae* with joints 2-5 of the funicle transverse, the club short ovate, compressed. Prothorax a little longer than broad, widest near the base, rapidly narrowed behind, more gradually so in front, and shallowly constricted at the apex; the basal margin truncate and depressed below the level of the disk; the dorsum

coarsely, closely and evenly punctate, except on an abbreviated smooth central line, the interspaces narrower than the punctures; the sides more shallowly punctate. *Elytra* cylindrical, a little wider than the prothorax, slightly produced at the apex, but the margin not explanate; crenate-striate, the striae not becoming shallower behind; the intervals convex, smooth, each with a single row of minute punctures; the apical portion of intervals 7 and 9 thickened and rather prominent and uniting at the apex with 3; interval 9 obtuse and not carinate. Length, 3-3.5 mm.; breadth, 0.8-1 mm.

Habitat.—Upolu Island: Two examples (sex uncertain), Apia, 1916 *(Dr. H. Swale)*.

Type in the British Museum.

Very similar to the only other described species of the genus, *T. latirostris* Champion (Trans. Linn. Soc. Lond., Zool. (2), XVI, July, 1914, p. 461), from the Seychelles, which differs as follows: The antennal club is smaller; the prothorax is much more finely punctate and more strongly constricted at the apex; the intervals on the elytra are rugulose, and 9 is carinate on the posterior half; interval 3 is free at the apex, and the apical junction of 7 and 9 is strongly produced laterally into a laminate angle, behind which the apical margin is narrowly explanate.

The Butterflies of the Samoan Islands.

BY O. H. SWEZEY.

In identifying the butterflies collected by Dr. H. C. Kellers on the Island of Tutuila in 1917-18, I found that there were very few records of butterflies collected on that one of the Samoan Group. Ten species were collected by Dr. Kellers, none of which are new to science.

Only a few papers were found in literature recording butterflies from Samoa, and altogether only twenty species (considering the synonymy) have been recorded. I have thought best to list all of the species, with bibliographic references so far as I was able to find them. The synonymy is taken from the various papers referred to. A number of the species are widely distributed in the South Pacific and very variable, so that their representatives in Samoa are considered by some authors as local varieties.

Anosia menippe Hübner.

Danais archippus Fabr. Butler, P. Z. S., p. 275, 1874, Tutuila, Upolu.

Danais plexippus Linn. Fraser, E. M. M., (2), V:147, 149, 1894, Upolu.

Anosia menippe Hüb. Waterhouse, Trans. Ent. Soc. London, p. 481, 1904, Upolu; Lufilufi; Savaii; Satapaitea.

Kellers, 2 specimens, Dec., 1917, April, 1918, Tutuila.

Danais obscurata Butler.

Danais melissa (Cramer). Butler, Ann. M. Nat. Hist. (4), V, p. 360, 1870, Upolu.

Danais obscurata Butler, P. Z. S., p. 275, 1874, Upolu.

Tirumala mellitula (Herr.-Sch.).

Danais mellitula Herrich-Schaeffer, Stett. Ent. Zeit., 30:70, 1869, Upolu.
Butler, P. Z. S., p. 275, 1874, Upolu.

Tirumala hamata. Fraser, E. M. M., (2), V, p. 174, 1894, Upolu.

Tirumala mellitula. Waterhouse, Trans. Ent. Soc. London, p. 492, 1904, Upolu: Lufilufi; Savaii: Satapaitea.
Kellers, 4 specimens, Dec., 1917; 2 specimens, April, 1918, Tutuila.

Deragena schmeltzi (Herr.-Sch.).

Euploea schmeltzi Herrich-Schaeffer, Stett. Ent. Zeit., 30:70, pl. II, fig. 8, Upolu.
Butler, P. Z. S., p. 277, 1874, Upolu.

Deragena schmelzii. Fraser, E. M. M., (2), V:147, 1894, Upolu.

Deragena schmeltzii. Waterhouse, Tr. Ent. Soc. London, p. 492, 1904, Upolu: Apia, Lufilufi; Savaii: Satapaitea.

Euploea eleutho var. **escholtzii** Felder.

Euploea eleutho Amoy & Gaimard, Freyc. Voy., t. 83, f. 2, 1815, Taiti; Navigators' Islands.
Butler, Trans. Ent. Soc. London, (3), V, p. 476, 1867.

Euploea eschscholtzii Felder, Reise der Novara, Lep. II, p. 345, 1867, Fiji.

Euploea eleutho var. *escholtzii.* Herrich-Schaeffer, Stett. Ent. Zeit., XXX, p. 138, pl. 2, fig. 9, 1869.
Kellers, 1 specimen, Dec., 1917; 9 specimens, April, 1918, Tutuila.

Diadema montrouzieri Butler.

Diadema montrouzieri Butler, P. Z. S., p. 281, 1874, Navigators' Islands.

Diadema lutescens Butler.

Diadema lutescens Butler, P. Z. S., p. 283, pl. XLIV, fig. 3, 1874, Ovalau, Fiji Islands.
Kellers, 1 specimen, April, 1918, Tutuila.

Atella bowdenia Butler.

Atella bowdenia Butler, P. Z. S., p. 687, 1873, Friendly Islands.
Atella egista Cramer, Herr-Sch., Stett. Ent. Zeit., XXX, p. 71, 1869, Upolu.
Atella bodenia. Fraser, E. M. M., (2), V, p. 149, 1894, Upolu.
Atella bowdenia. Waterhouse, Trans. Ent. Soc., London, p. 493, 1904. Savaii: Satapaitea; Upolu: Lufilufi, Apia.
Kellers, 2 specimens, Dec., 1917, 6 specimens, April, 1918, Tutuila.

Junonia villida Fabr.

Junonia villida. Fraser, E. M. M., (2), V, p. 149, 1894, Upolu.
Waterhouse, Trans. Ent. Soc. London, p. 493, 1904, Savaii: Satapaitea; Upolu: Lufilufi, Satapouala.
Kellers, 5 specimens, Dec., 1917; 5 specimens, April, 1918, Tutuila.

Hypolimnas bolina Linn.

Anosia otaheitae Felder. ..... Samoa.
Hudson, N. Z. Moths and Butterflies, p. 105, 1898, Samoa.
Diadema otaheitae. Butler, P. Z. S., p. 281, 1874, Taiti.
Hypolimnas bolina var. *otaheitae.* Fraser, E. M. M., (2), V, p. 147, 1894, Upolu.
Hypolimnas bolina. Waterhouse, Trans. Ent. Soc. London, p. 493, 1904, Savaii: Satapaitea, Salilalonga; Upolu: Apia, Lufilufi, Satapouala.
Kellers, 4 specimens, Dec., 1917; 18 specimens, April, 1918, Tutuila.

Melanitis leda Linn.

Melanitis leda var. *solandra*. Butler, P. Z. S., p. 279, 1874, Tutuila.

Melanitis leda. Fraser, E. M. M., (2), V, p. 148, 1894, Upolu.

Waterhouse, Trans. Ent. Soc. London, p. 494, 1904, Savaii: Satapaitea, Salilalonga; Upolu: Lufilufi.

Zizera labradus (Godt.).

Polymmatus labradus Godt. Enc. Meth., IX, p. 680, 1819.

Lycaena alsulus Herr.-Sch., Stett. Ent. Zeit., 30:75, 1869, Upolu.

Zizera labradus. Druce, P. Z. S., p. 435, 1892, Upolu: Tutuila.

Zizera lulu. Druce, P. Z. S., p. 436, 1892, Samoa.

Lycaena communis. Fraser, E. M. M., (2), V, p. 148, 1894, Upolu.

Zizera labradus. Waterhouse, Trans. Ent. Soc., London, p. 494, 1904, Savaii: Satapaitea; Upolu: Lufilufi, Apia.

Zizera alsulus. Waterhouse, l. c., Savaii: Satapaitea; Upolu: Lufilufi.

Kellers, 2 specimens, Dec., 1917; 2 specimens, April, 1918, Tutuila.

Nacaduba samoaensis Druce.

Nacaduba samoaensis. Druce, P. Z. S., p. 437, 1892, Samoa.

Waterhouse, Tr. Ent. Soc. London, p. 494, 1904, Savaii: Satapaitea.

Jamides woodfordi Butler.

Jamides woodfordi Butler, Ann. Mag. Nat. Hist., (5), XIII:346, 1884, Fiji.

Lycaena woodfordi. Fraser, E. M. M., (2), V:149, 1894, Upolu.

Jamides carissima (Butler).

Lampides carissima Butler, P. Z. S., p. 615, pl. LXVII, figs. 3, 4, 1875.

Jamides carissima. Druce, P. Z. S., p. 443, 1892, Samoa.
Waterhouse, Trans. Ent. Soc. London, p. 495, 1904, Savaii: Satapaitea; Upolu: Lufilufi.

Catochrysops cnejus (Fabr.).

Lycaena samoa Herr.-Sch., Stett. Ent. Zeit., 30:73, Tab. IV, fig. 18, Vanua Valava.

Catochrysops cnejus. Waterhouse, Trans. Ent. Soc. London, p. 495, 1904, Savaii: Satapaitea; Upolu: Lufilufi.

Catochrysops platissa (Herr.-Sch.).

Lycaena platissa Herr.-Sch., Stett. Ent. Zeit., 30:74, 1869, Rockampton.

Catochrysops platissa. Druce, P. Z. S., p. 444, 1892, Samoa.
Waterhouse, Trans. Ent. Soc. London, p. 495, 1904, Savaii: Satapaitea; Upolu: Lufilufi.
Kellers, 3 specimens, Dec., 1917, Tutuila.

Lampides argentina (Prittwitz).

Lycaena argentina Pritt., Stett. Ent. Zeit., 28:274, 1867, Samoa.

Lampides argentina. Butler, P. Z. S., p. 285, 1874, New Hebrides.

Papilio godeffroyi Semper.

Papilio godeffroyi Semper, Trans. Ent. Soc. London, (3), II: 469, pl. 24, 1866, Upolu.
Butler, P. Z. S., p. 289, 1874, Upolu.
Fraser, E. M. M., (2), V:148, 1894, Upolu.
Kellers, 1 specimen, April, 1918, Tutuila.

Unnamed skipper.

Fraser, E. M. M., (2), V:148, 1894, Upolu.

Adoretus sinicus Burmeister.—Mr. Timberlake exhibited a collection of *Adoretus* from the Oriental region, including *tenuimaculatus* from Japan, *sinicus* from China and Formosa, and *compressus* from Java. The species found in the Hawaiian Islands is not *tenuimaculatus*, as it has been called in the past, but *sinicus*. This determination of the species in Hawaii was first made by Ohaus about ten years ago, but his work has escaped the attention of local entomologists. (Ent. Blatt, Berlin, 8, pp. 218-227, 1912).

Eumerus strigatus.—Mr. Whitney exhibited a few specimens of this fly, which were reared from daffodil bulbs imported from the Coast.

Mirodon equestris.—Mr. Whitney reported the larvae of this fly as intercepted in daffodils.

New Guinea butterflies.—Mr. Fullaway exhibited a collection of butterflies from New Guinea.

Determinations of immigrant beetles.—Mr. Fullaway exhibited the following named beetles with notes on their determination by Dr. E. C. Van Dyke of the University of California. The determinations are based on specimens collected by Messrs. Swezey and Fullaway and forwarded recently to Dr. Van Dyke by Mr. Fullaway.

Eucnocerus anthrenoides Sharp. (?)—The Dermestid beetle reported by Mr. Swezey at the August meeting as breeding abundantly in a box of garden seeds. It is a species found in Mexico and Panama.

Ataenius cognatus Lec. and *Psammodius nanus* De Geer.—Two Aphodiids found in cowdung and in trash on the ground. The former common in Eastern United States, the latter found in Southern California, Mexico and Chile.

Saprinus fimbriatus Lec. and *Paromalus lautus* Zimm.—Two Histerids found in cow manure, where they are predacious on other insects. The former is common on the Pacific Coast, the latter found sparingly in both the eastern and western parts of the United States.

Cercyon quisquilius Linn. and *Cryptopleurum minutus* Fab.—Two Hydrophyllids living in cowdung, where they are predacious on other insects. More or less cosmopolitan species.

Oxytelus sculptus Grav.—A Staphilinid found in cowdung. A cosmopolitan species.

These are the first published records of these beetles in Hawaii. However, *Ataenius cognatus* is the beetle recorded in the Fauna Hawaiiensis as *A. stercorator* (Fab.). The six following species of the list have not been previously recorded, but their presence has been known for a number of years, so that they are not to be considered as newly arrived immigrants.

Report of Committee on Common Names of Economic Insects in Hawaii.

In the preparation of its report this Committee has found it advisable to make a few corrections to the list of common names adopted by the Society on March 6, 1913 (published in these Proceedings, vol. 2, pp. 296-300), as well as to present many new names. The correction of the old names has been made necessary through increased knowledge of the habits, distribution, etc., of the insects, or because the old name has proved to be of too general application. Whenever possible a name already in use here or elsewhere has been adopted, especially for the insects found in the lists of common names adopted by the American Association of Economic Entomologists.

P. H. Timberlake,
Edw. M. Ehrhorn,
O. H. Swezey,
Committee.

Coleoptera.

Algaroba (or Mesquite) weevil	*Bruchus proposis* Le Conte.
Algaroba (or Mesquite) borer	*Cyllene crinicornis* Chevrolat.
Australian fern weevil	*Syagrius futvitarsis* Pascoe.
Cadelle (or mealworm)	*Tenebroides mauritanicus* (Linnaeus)
Chinese rose beetle	*Adoretus sinicus* Burmeister.
Dolichos weevil	*Bruchus phaseoli* Gyllenhal.
Drug-store beetle	*Sitodrepa panicea* (Linnaeus)
Dried-fruit beetle	*Carpophilus hemipterus* (Linnaeus)
Fijian Ginger weevil	*Elytrotcinus subtruncatus* (Fairmaire)
Four-spotted bean weevil	*Bruchus quadrimaculatus* (Fabricius)
Glue bush weevil	*Bruchus sallaei* Sharp.
Granary weevil	*Sitophila granaria* Linnaeus.
Gray Acacia weevil	*Bruchus pruininus* Horn.
Leather beetle	*Dermestes vulpinus* Fabricius.
Little Coconut weevil	*Diocalandra taitense* (Guerin)
Mango weevil	*Sternochetus mangiferae* (Fabricius)
Mexican bean weevil	*Spermophagus pectoralis* Sharp.
Mexican bookworm	*Catorama Mexicana* Chevrolat.
Monkey-pod borer	*Xystrocera globosa* (Olivier)
Monkey-pod weevil	*Bruchus limbatus* Horn.
Rice weevil	*Sitophila oryzae* Linnaeus.
Rusty flour beetle	*Tribolium ferrugineum* Fabricius.
Sweet potato weevil	*Cylas elegantulus* Summers.
Tamarind weevil	*Caryoborus gonager* (Fabricius)
Tamarind snout weevil	*Sitophila linearis* Herbst.
Wardrobe beetle	*Attagenus gloriosae* (Fabricius)
West Indian sweet-potato weevil	*Euscepes batatae* (Waterhouse)

Hemiptera.

Araucaria mealybug	*Eriococcus araucariae* Maskell.
Aster-root aphis	*Aphis middletonii* Thomas.
Bur-clover aphis	*Aphis medicaginis* Koch.
Brown citrus aphis	*Myzus citricidus* Kirkaldy.
Cinnamon scale	*Eucalymnatus tessellatus* (Signoret)
Cotton (or melon) aphis	*Aphis gossypii* Glover.
Greenhouse whitefly	*Asterochiton vaporariorum* (Westwood)
Hibiscus whitefly	*Pealius hibisci* (Kotinsky)
Japanese mealybug	*Pseudococcus kraunhiae* (Kuwana)
Palm (or orchid) aphis	*Cerataphis lataniae* (Boisduval)
Soft brown scale	*Coccus hesperidum* Linnaeus.
Giffard's whitefly	*Bemisia giffardi* (Kotinsky)

Lepidoptera.

Cereal moth	*Ephestia elutella* Hübner.
Diamond-back moth	*Plutella maculipennis* Curtis.
False pink boll-worm	*Pyroderces rileyi* (Walsingham)
Hawaiian tobacco worm	*Phlegethontius blackburni* (Butler)
Koa seed worm	*Crytophlebia illepida* (Butler)
Mediterranean flour-moth	*Ephestia kuhniella* Zeller.
Pink boll-worm	*Polyedra gossypiella* (Saunders)
Potato-tuber moth (or tobacco split-worm)	*Phthorimaea operculella* (Zeller)

Diptera.

Cane-borer parasite	*Cormasia sphenophori* Villeneuve.
Cow-dung sarcophaga	*Sarcophaga pallinervis* Thomson.
Dung sarcophaga	*Sarcophaga haemorrhoidalis* Fallen.
Serpentine leafminer	*Agromyza pusilla* Meigen.

Miscellaneous.

African mole-cricket	*Gryllotalpa africana* Fabricius
Bedbug	*Cimex lectularius* Linnaeus.
Hen-flea	*Echidnophaga gallinacea* (Westwood)

Hymenoptera.

Bruchid egg-parasite	*Uscana semifumipennis* Girault.
Cattleya-fly	*Harmolita orchidearum* (Westwood)
Chinese Dryinid	*Pseudogonatopus hospes* Perkins.
Corn leafhopper parasite	*Paranagrus osborni* Fullaway.
Crazy ant	*Prenolepis longicornis* (Latreille)
Formosan ootetrastichus	*Ootetrastichus formosanus* Timberlake
Guinea ant	*Tetramorium guineense* (Fabricius)
Little yellow ant	*Plagiolepis exigua* Forel.
Oriental mealy-bug parasite	*Paurodia peregrina* Timberlake.
Sicilian mealy-bug parasite	*Tanaomastix abnormis* (Girault.)
Scolia wasp	*Scolia manilae* Ashmead.

Immigrant Records for 1920.

BY THE EDITOR.

During the year 1920, thirteen immigrant insects were recorded for the first time. A few of them were probably quite recent arrivals, but for the most part they have been known here for a number of years without having been determined or recorded. One species, *Ammophorus insularis*, was recorded from Honolulu in 1858, but had not been seen since. It escaped mention in the Fauna Hawaiiensis. It has now been rediscovered.

A list is here given with the pages on which records occur, and notes in regard to habits, etc.

End of Volume IV.

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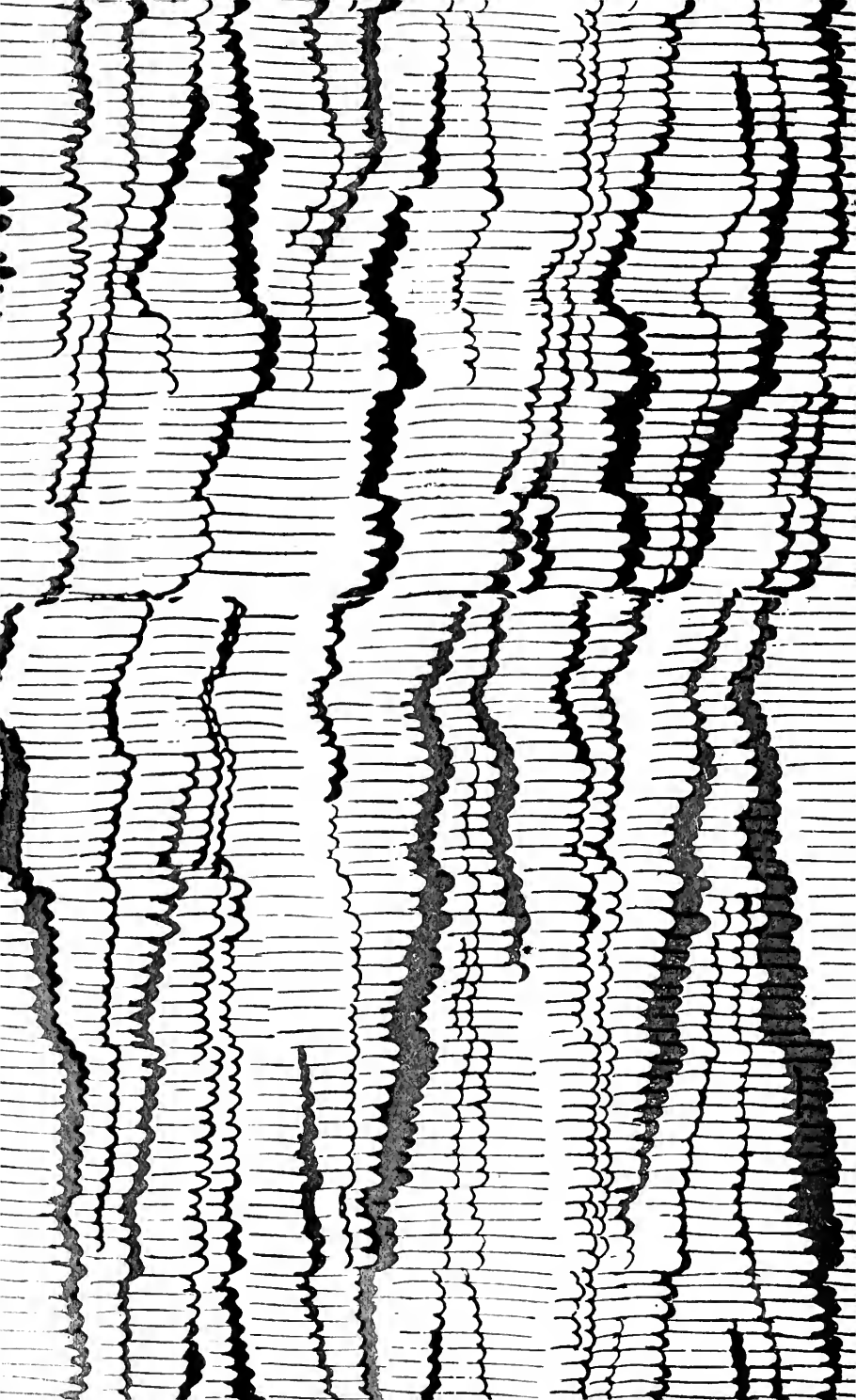

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