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PROCEEDINGS
OF THE
Hawaiian
Entomological Society

FOR

August, 1908—June, 1909

(with 2 Plates and 3 Text Figures)



HONOLULU, HAWAII.

PRICE, 50 CENTS.

Towards the tips of the antennae, the joints become dark-colored and slenderer, so that the antennae are attenuate apically. The pedicel is very short, compared with the other joints, but it is evidently longer than wide. Length about 4 mm.

Hab: Australia, Queensland; larva forming a sac on the sides of the abdomen of small crickets (Trigonidiidae).

Obs. Although I have referred this insect to the Dryinidae, largely on account of its larval habits, the larval sac being of the same form as that of *Aphelopus*, which likewise has non-chelate tarsi, yet its twelve-jointed antennae might be held sufficient to exclude it from this family.

AUGUST 6th, 1908.

The forty-third regular meeting was held in the usual place.

MEMBER ELECTED.

Dr. E. V. Wilcox.

NOTES.

Mr. Van Dine reported having carefully examined about one thousand mango seeds collected by Dr. Baldwin in nine localities of Maui, and not finding any weevils (*Cryptorhynchus mangiferae*). This would indicate that possibly this pest has not yet spread from Oahu to Maui.

Mr. Giffard opened the discussion on the mango scale bugs at the Moanalua Gardens and their distribution to other portions of the islands. Neither Mr. Kotinsky nor Mr. Van Dine have observed any of these scales outside of Moanalua, the former not having seen them alive even there since their fumigation by the Hawaiian Board of Agriculture.

Dr. Wilcox made inquiry for the Hawaiian Promotion Committee as to the feasibility of introducing rattan (*Calamus*, Palmaceae) from Malaya, probably Java for cultivation. In view of the common presence of borers in those plants in the Orient, Mr. Giffard doubted whether the Board of Agriculture would allow their importation. It was suggested that a less risky method would be to bring seeds. Dr. Wilcox asked a similar question relative to the cocaine (*Erythroxylon coca*, Linaceae) plant which it is contemplated to bring from Peru and Mexico.

Mr. Kotinsky reported having discovered aphids on the mango trees brought by Mr. McIntyre from Manila, although they were grown in a supposedly insect proof house and transported in screened wardian cases. Mr. Van Dine stated that the aphid was probably brought in by ants.

Mr. Giffard reported having read of the presence of the Argentine ant (*Iridomyrmex humilis*) in California, warning the inspector against it, also inquiring whether anything akin to it has been observed here.

Dr. Wilcox discussed the apparent possibility for usefulness of sulphur trioxide, which, while an excellent insecticide and fungus disinfectant, is innocuous to colored materials. Mr. Giffard inquired whether other entomologists observed the difference of behavior of the same species of insect in different cyanide bottles. Mr. Van Dine said that he finds chloroform a useful substance owing to the rapidity in killing specimens. Dr. Wilcox said that the rapid killing bottle must be an advantage since the insects are killed so quickly, that no time is left to contract muscles and thus get organs out of shape and normal position.

Mr. Kotinsky reported having bred *Lycaena* sp. (one of the two Lantana Lycaenids) from pepper pods on the surface of which larvae were found feeding. It seems however that this was an accidental deposit of several eggs probably by one female, as outside of the first six or seven no other peppers were observed damaged by this insect.

SEPTEMBER 7th, 1908.

The forty-fourth regular meeting was held in the usual place.

NOTES AND EXHIBITION OF SPECIMENS.

The time of the meeting was chiefly occupied in discussion of the Argentine ant (*Iridomyrmex humilis* Mayr). Mr. Kotinsky read a letter he had received from Mr. E. M. Ehrhorn, San Francisco, Cal., in which the situation as regards this ant in California, was given. Mr. Kotinsky had also received specimens of the ant from Mr. Ehrhorn. From the fact that this ant has become established in California, and that it is known to be so serious a household and agricultural pest in Louisiana where it has been established for quite a number of years, our port inspectors should be particularly watchful lest it become

introduced into these islands by way of the shipping from San Francisco.

Dr. Filippo Silvestri, entomologist at the Royal School of Agriculture, Portici, Italy, who had been spending a few days investigating the methods of combatting insect pests as carried on in the Hawaiian Islands, was present, and favored the Society with some remarks and suggestions.

Dr. Silvestri reported having collected a Lepismid on the rocks at Waianae which he thought would prove to be a new species, and offered to send the description for publication in the Proceedings. He also reported having discovered an important Protozoan, parasitic on one of our species of termites. The slide preparations that he made he will study at home. He spoke with great appreciation of the value of the work done with parasites on these islands in combatting the various injurious insects, particularly *Perkinsiella saccharicida* (Homoptera-Delphacidae) the leaf-hopper pest of the sugar cane.

Having been informed that *Coccus tuberculatus* described by him on page 168 of Proc. Haw. Ent. Soc., I, No. 5, was a homonym, Mr. Kotinsky offered to change the name to *C. muiri* in honor of the collector.

NOVEMBER 5th, 1908.

The forty-fifth regular meeting of the Society was held in the usual place.

MEMBERS ELECTED.

D. T. Fullaway, J. P. Cooke.

PAPERS READ.

Notes on a Collection of *Odynerus* from Maui.

BY W. M. GIFFARD.

(Specimens exhibited).

This collection of 19 species of *Odynerus* was made in Wailuku and Iao Valley, Maui, on March 22nd, and at Olowalu, Maui, on March 25th, 1908. The number of species so far recorded for the island of Maui is 23, which with two species (*Chelodynerus chelifer* and *O. microdemas*) included in this collection will now make 25 species recorded for that island.*

* *C. chelifer* is recorded on the adjacent islands of Molokai and Lanai whilst *O. microdemas* is similarly so on Molokai only.

Proc. Haw. Ent. Soc., II, No. 2, Sept., 1909.

The species collected by me on the above dates and their distribution is as follows:

Wailuku (Outskirts of town).

10. *O. aprepes*; male, female. (Female, so far unrecorded).
 2. *O. konanus*; male.
 6 *O. molokaiensis*; male, female.
 6 *O. insulicola*; male, female.
 18 *O. sandwichensis*; male, female.
 1 *O. nigripennis*; male.

Total, 6 species.

Iao Valley, 1300 ft. elevation.

- 2 *O. naiadum*; male.
 21. *O. purpurifer*; male, female.
 24 *O. camelinus*; male, female.
 1 *O. homoeogaster* (*deinogaster?*); male.
 1 *O. tempe*; male. (Female only recorded).
 2 *O. nigripennis*; male, female.
 1. *O. erythrostactes*; male.
 1 *O. instabilis*; male.
 10 (*O. ecostatus*, *O. laevisulcatus*); male, female.

Total, 10 species.

Olowalu Coast.

- 7 *C. chelifer*; male, female.
 1 *Pseudopterocheilus congruus*; male. } flying
 2 *O. microdemas*; male, female. } together.
 1 *O. frater*; male.
 2. *O. sandwichensis*; male, female.
 2 *O. insulicola*; female.
 2 *O. molokaiensis*; male, female.

Total, 7 species.

Olowalu, 1200 ft. elevation.

- 1 *O. ecostatus*; male.

NOTE:—Certain of the Wailuku species in this collection might well be included together with those of Iao Valley for the purposes of this exhibit, some having been as a matter of fact taken in both places by previous collectors (See Proc. Haw. Ent. Soc., Vol. I, pt. 3, p. 86). I have separated the distribution of the species in the present exhibit in order to show difference in elevation of the collecting ground and also because certain of the Iao Valley species proper are recorded only as taken from the higher elevation.

A Note on a Cimicid Hemipteron with deformed head, and on a Membracid with deformed pronotum.

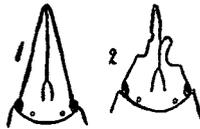
BY G. W. KIRKALDY.

(Presented by O. H. Swezey. Specimens exhibited).

Deformed antennae and legs are not of unusual occurrence in certain families of Heteroptera, especially in Coreidae and Myodoichidae, these being due in many cases to injuries received in nymph-hood. Similar abnormalities in head and pronotum are not so common, and I therefore place two on record.

The first is a curiously deformed head of a female Phyllocephaline Cimicid, *Megarrhamphus hastatus*, from Java, collected by Mr. Muir. In the normal condition of the head viewed from above (fig. 1), the juga are very much elongate, the tylus being very short and closed around in front by them. In this deformed specimen, the whole head is shortened, the juga are a little crumpled, much misshapen, the right jugum being rounded, shortened, and swollen apically (fig. 2).

1. *Megarrhamphus hastatus*
normal head;
2. The same abnormal.



One of the characteristics of a typical Membracid Homopteron is the possession of an elongate process of the pronotum, which lies more or less flat along the back. I now exhibit a specimen of a species of *Centrotypus* collected by Mr. Muir at Parit Buntar, in the Malay Peninsula, which has this process crumpled and much shortened, the main part of the pronotum being also crumpled on one side.

Banana Leaf-rollers of the Genus *Omiodes* [Lep.].

BY OTTO H. SWEZEY.

(Specimens exhibited).

Omiodes blackburni (Butler).

This species is the common Palm Leaf-roller, which works such havoc with the leaves of coconut palms. It is known to feed more or less on bananas particularly the wild or native varieties. Dr. Perkins, several years ago, reared numerous moths from caterpillars which were very abundant on native bananas at Makaweli, Kauai. A sample sent to Meyrick was identified as this species.

I have never until recently found the caterpillars of this species feeding on bananas. In August of this year I found quite a number of them feeding on bananas where they were growing wild on the plateau in Iao Valley, Maui. I also found them quite numerous in Nahiku, Maui, where there are numerous patches of wild bananas along the government road. In October, I found them feeding on the tall-growing cultivated varieties at Kohala, Hawaii, and through the districts of the windward side of the island from Kukuhaele to Hilo.

Omiodes meyricki Swezey.

Mention of my discovery of the caterpillars of this species, feeding on wild bananas above Honomu, Hawaii, is found in Proc. Haw. Ent. Soc., Vol. I, p. 134. The moths which I reared from them proved to be a new species, and it was described later (Bull. Ent. H. S. P. A., V, p. 24, 1907).

In October of this year, while on an inspection trip through the sugar plantations of Hawaii, I found the caterpillars of this species very numerous on wild bananas, growing in the gulches on the windward side of the island, from Ookala to Hilo, also at Mountain View and Paho. Wherever I chanced to see wild banana plants in these regions, they had been much eaten by these caterpillars, and I could usually find plenty of them of all sizes.

Omiodes musicola n. sp.

Male, female, 25-30 mm. Head dark fuscous in front of antennae, ochreous fuscous behind; thorax and abdomen with fuscous and ochreous scales mixed, some ferruginous scales also on some of the segments of the abdomen, apical margins of abdominal segments whitish; genital tufts nearly black. Antennae pale fuscous, ochreous

in front; palpi fuscous, ochreous below; tongue and tips of maxillary palpi fulvous; legs ochreous, femora and fore tibiae with some fuscous. Forewings dark fuscous with some ochreous scales mixed in, more abundant on costa, and a few scattered ferruginous scales, more abundant at base, veins ochreous; first line ochreous, angled outwardly about middle making nearly a right angle, posteriorly heavily margined with dark fuscous; a more or less obscure dark fuscous orbicular dot; an ochreous discal spot traversed by a transverse black spot; second line ochreous, angled outwardly below costa and again below middle, margined anteriorly with dark fuscous; a series of terminal black spots between the veins; cilia pale fuscous, darker at base. Hindwings slightly paler fuscous than forewings, a dark fuscous discal dot, an ochreous post-median line anteriorly dark fuscous margined, angled outwardly below middle; a dark fuscous line on termen, cilia as in forewings.

The color pattern of this species is very similar to that of *O. blackburni* and *O. meyricki*; but in this the dark fuscous predominates, while in *blackburni* ochreous predominates, and ferruginous predominates in *meyricki*. The angulation of the first line of forewings is nearly a right angle in *musicola*, while in the other two mentioned species it is an acute angle. The angulation of second line below middle is less acute in this species than in the other two.

In August, 1908, I discovered numerous caterpillars of all sizes, also eggs, on wild bananas high up in Iao Valley and at Nahiku, Maui. These caterpillars were different from any *Omiodes* caterpillars I had yet seen, and on rearing, proved to be different from any previously described species; hence, I am describing it as new.

The egg-masses were found on the under side of the leaf mostly along the midrib, but also on the surface away from the midrib. The eggs were similar to those of other species of *Omiodes*, and about as many in a mass as in those of *O. blackburni*.

Full-grown larva about 27 mm.; dull pale greenish; head testaceous with some light brownish checkering on upper part, a round black spot in each lobe in front, two oblique short black lines on paraclypeus, eyes black with a dark brown streak extending upward from them, a short black line on posterior margin of head extending upward from a black dot at postero-ventral angle; cervical shield with black lateral margins, anterior margin slightly fuscous and with a row of ten dark fuscous dots, a large broad elongate longitudinal black bar in each lateral lobe, on the dorsum between these and near the posterior margin are two groups of five tiny dark fuscous dots; tubercle in front of spiracle with a black line on dorsal margin; tubercles ii on

segments 3 and 4 almost entirely blackened, all the other tubercles are at least slightly infuscated, some more so, and those of segments 11-13 and of row iii especially are conspicuously infuscated; spiracles circular, yellowish.

Pupa, 14 mm. long, medium brown, darker on dorsum; wing-cases extend to apex of 4th abdominal segment; leg-cases and antenna-cases extend about two segments farther, free beyond 4th segment; cremaster subconical with a cluster of eight hooked bristles at apex fastened into silk of the cocoon.

The smaller caterpillars fed on the under surface along the midrib of the leaf where it was convenient for them to make a web for their protection; larger ones secrete themselves in rolled up edges of the leaves. The pupae are found in the latter place or some other favorable situation. The pupal stage occupied 11 days.

DECEMBER 3rd, 1908.

The forty-sixth regular and 4th annual meeting was held in the usual place.

Revised Constitution and By-Laws as adopted at this meeting.

ARTICLE I. NAME.

The name of this organization shall be *The Hawaiian Entomological Society*.

ARTICLE II. OBJECTS.

The objects 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 III. MEMBERSHIP.

The Society shall consist of active, corresponding and honorary members. No corresponding members shall be elected from residents on the Island of Oahu.

ARTICLE IV. OFFICERS.

The officers of the Society shall be a President, Vice-President and Secretary-Treasurer, to be elected by ballot at the an-

nual meeting. The duties of these officers, besides those usually pertaining to their respective offices, shall be jointly to act as Executive Committee and to transact the business of the Society not otherwise provided for. Also, the President shall deliver an address at the annual meeting.

ARTICLE V. 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.

ARTICLE VI. AMENDMENTS.

This Constitution 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.

By-Laws.

1.—The annual dues for active members shall be five dollars, and for corresponding members two dollars. Honorary members shall be exempt from dues.

2.—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 or represented by proxy shall be necessary for election.

3.—Five members shall constitute a quorum for the transaction of business. Active members may be represented by written proxy presented to the Secretary previous to the meeting.

4.—Written notice of all meetings of the Society shall be sent to all members at least three days in advance.

5.—Regular meetings shall open at 3.30 P. M. and close not over an hour and a half later.

6.—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.

7.—In the absence of President and Vice-President a chairman pro-tem may be elected by a majority vote of active members present, or represented by proxy.

8.—The order of proceedings at all meetings shall be as follows:

- a. Roll call of members and submission of proxies.
- b. Reading and approval of minutes.
- c. Reports of officers and committees.
- d. Nomination and election of members.
- e. Unfinished or new business.
- f. Entomological program.
- g. Nomination and election of officers for the ensuing year.

The following officers were elected for the ensuing year:

President.....OTTO H. SWEZEY.
 Vice-President.....D. L. VAN DINE.
 Secretary-Treasurer.....D. B. KUHN.

PAPERS READ.

Generic Synopsis of Hawaiian Macrolepidoptera.

BY OTTO H. SWEZEY.

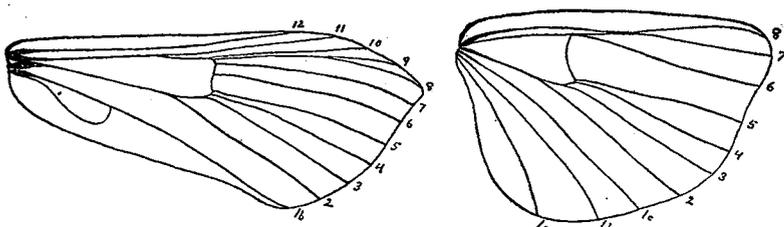
[Presidential address].

In the use of the part "Macrolepidoptera" of the Fauna Hawaiianensis, there are excellent tables to assist in the identification of species; but one finds a lack of generic and family tables. On account of this, I have often found difficulty in determining to what genus a specimen belonged, if it was not closely related to a species or genus with which I was already familiar. Primarily for my own convenience I have constructed the following tables of families and genera. My tables are based on Meyrick's classification, and are largely adapted from various tables of his, necessarily modified considerably to include only genera existing here, and especially for the new genera which have not before appeared in tables.

In some cases genera have been split up or rearranged by more recent writers (as for example: *Agrotis* the species of which have been assigned by Hampson to several different genera); in other cases Meyrick has assigned species to different genera from what other writers have; but in these tables the genera are used as given by Meyrick in the Fauna, purposely that they may be conveniently used in connection with the Fauna.

As is well known, tables are only a help, and can not be depended on exclusively in assigning specimens to their proper genera; but the fact that for many of the genera in the Fauna, no characters are given, shows all the more the usefulness of tables of this kind, and I think they will be fully appreciated by those interested in Hawaiian "Macros."

I have verified the tables for the most of the genera; but of some of the rarer ones I have not seen specimens, and have had to rely on the accuracy of descriptions, in the construction of these tables.



As a sample of wing venation, I insert a cut of wings of *Omiodes blackburni*, the Palm Leafroller. These wings have all veins present; whereas many genera have one or more veins missing. They are numbered by the method used by Meyrick and others, which is more simple than that used by some Lepidopterists.

As tabulated, there are four Superfamilies represented; 15 Families; and 61 Genera.

1. Hind wings with 1c present.....(D) PYRALIDINA
Hind wings with 1c absent.....2.
2. Antennae terminally clavate.....(C) PAPILIONINA.
Antennae not terminally clavate.....3.
3. Forewings with 5 basally approximated to 4..(A) CARADRININA
Forewings with 5 parallel to 4 or approximated to 6.....
..... (B) NOTODONTINA.

(A) CARADRININA.

1. Hindwings with 5 well developed.....(I) CARADRINIDAE.
Hind wings with 5 imperfect or obsolete.....(II) PLUSIADAE.

(I) CARADRINIDAE.

1. Eyes hairy *Leucania*.
Eyes not hairy 2.
2. Middle and posterior tibiae spinose..... 3.
Middle and posterior tibiae not spinose..... 4.
3. Anterior tibiae with two apical spines and two on inner side.
..... *Heliothis*.
Anterior tibiae with more spines than above *Agrotis*.

4. Abdomen more or less crested.....**Spodoptera**.
 Abdomen not crested**Caradrina**.

(II) PLUSIADAЕ.

1. Abdomen crested.2.
 Abdomen not crested.....3.
 2. Abdomen with small dorsal tuft near base.....**Hypenodes**.
 Abdomen with 3 large dorsal tufts.....**Plusia**.
 3. Palpi porrect4.
 Palpi upturned.5.
 4. Hind wings with 4 and 5 parallel.....**Nesamiptis**.
 Hind wings with 4 and 5 not parallel.....**Hypocala**.
 5. Forewings with termen angulately produced in middle.....
**Cosmophila**.
 Forewings not so produced.....6.
 6. Cell of hind wing very short.....**Adrapsa**.
 Cell of hind wing normal.....**Simplexia**.

(B) NOTODONTINA.

1. Hind wings with 5 imperfect or obsolete.(IV) **SELIDOSEMIDAE**.
 Hind wings with 5 fully developed.....2.
 2. Antennae thickened towards middle or posteriorly.....
(V) **SPHINGIDAE**.
 Antennae not thickened(III) **HYDRIOMENIDAE**.

(III) HYDRIOMENIDAE.

1. Face rough-haired.**Dasyuris**.
 Face with conical tuft of scales.....2.
 2. Antennae in male unipectinated.....**Prognostola**.
 Antennae in male bipectinated.....**Xanthorhoe**.
 Antennae in male ciliated.....3.
 3. Abdomen crested.**Euematoge**.
 Abdomen not crested.....**Hydriomena**.

(IV) SELIDOSEMIDAE.

1. Hind wings in male above with median streak of erect hairs,
 apex of fore wing strongly rounded.....**Sisyrophyta**.
 Hind wings in male clothed with long hairs towards dorsum,
 apex of fore wing produced.....**Acrodrepanis**.
 Hind wings in male normal, apex not peculiar.....2.
 2. Fore wings in male with large patch of modified scales in
 cell beneath.**Nesochlide**.
 Fore wings in male not as above.....3.
 3. Posterior tibiae in male dilated, containing hair-pencil, size
 more than 25 mm.....**Scotorythra**.
 Posterior tibiae in male not dilated, without hair-pencil, size
 25 mm. or less.....**Tritocleis**.

(V) SPHINGIDAE.

1. Thorax with short double posterior tuft.....**Sphinx**.
 Thorax without above.....**Dellephila**.

(C) PAPHILIONINA.

1. Anterior legs of male useless for walking. (VII) NYMPHALIDAE.
Anterior legs of male well developed.....2.
2. Anterior tarsi of male more or less abbreviated, or with one
or both claws absent.....(VIII) LYCAENIDAE.
Anterior tarsi of male not abbreviated, claws developed.....
..... (VI) PIERIDAE.

(VI) PIERIDAE.

..... Pieris.

(VII) NYMPHALIDAE.

Eyes hairyVanessa.
Eyes glabrous.Anosia.

(VIII) LYCAENIDAE.

..... Lycaena.

(D) PYRALIDINA.

1. Fore wings six-cleft.....(XV) ORNEODIDAE.
Fore wings not six-cleft.....2.
2. Hind wings with defined pecten of hairs on lower margin of
cell towards base.3.
Hind wings without such pecten (sometimes with loose scat-
tered hairs)5.
3. Fore wings with 7 absent.....(IX) PHYCITIDAE.
Fore wings with 7 present.....4.
4. Maxillary palpi triangularly scaled.....(XI) CRAMBIDAE.
Maxillary palpi not triangularly scaled....(X) GALLERIDAE.
5. Wings cleft, or entire, 8 and 9 of fore wings separate.....
..... (XIV) PTEROPHORIDAE
Wings entire, 8 and 9 of fore wings stalked.....6.
6. Fore wings with vein 7 rising out of 8... (XIII) PYRALIDIDAE.
Fore wings with vein 7 separate from 8... (XII) PYRAUSTIDAE.

(IX) PHYCITIDAE.

1. Hind wings with 4 and 5 approximated.....Cryptoblabes.
Hind wings with 5 stalked with 4, or wanting.....2.
2. Fore wings with 5 absent.....3.
Fore wings with 5 present.....5.
3. Labial palpi erect.....Ephestia.
Labial palpi porrect.....4.
4. Hind wings with 3 and 4 stalked.....Plodia.
Hind wings with 3 and 4 separate..... (new genus)*

* For an unnamed species bred from flower heads of silversword plant (*Argyroxiphium*) in the crater of Haleakala, Maui.

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|----|--|--------------|
| 5. | Fore wings with 11 veins..... | 6. |
| | Fore wings with 10 veins..... | 7. |
| 6. | Fore wings with 4 and 5 separate..... | Genophantis. |
| | Fore wings with 4 and 5 stalked..... | Myelois. |
| 7. | Hind wings with 3 and 4 stalked..... | Ephesiodes. |
| | Hind wings with 3 and 4 approximated or connate..... | Homoeosoma. |

(X) GALLERIADAE.

..... . Meliphora.

(XI) CRAMBIDAE.

- | | | |
|----|--|---------------|
| 1. | Fore wings in male with semitransparent patch in cell..... | Euchromius. |
| | Fore wings in male without such patch..... | 2 |
| 2. | Termen of fore wings deeply excavated below middle..... | Prionoptyryx. |
| | Termen of fore wings not excavated..... | Talis. |

(XII) PYRAUSTIDAE.

- | | | |
|-----|--|--------------|
| 1. | Male with bladder-like swelling beneath costa of hind wing at base..... | Hyperectis. |
| | Male without such character..... | 2. |
| 2. | Fore wing with more or less developed tufts of raised scales in cell..... | Scoparia. |
| | Fore wing without such tufts..... | 3. |
| 3. | Fore wings 4 times as long as wide, legs extremely long..... | Lineodes. |
| | Not as above..... | 4. |
| 4. | Antenna of male with base of shaft excised and a tuft of hair from extremity of basal joint..... | Hymenia. |
| | Antenna of male not so..... | 5. |
| 5. | Palpi upturned..... | 6. |
| | Palpi porrect..... | 8' |
| 6. | Maxillary palpi strongly dilated with scales..... | Margaronia. |
| | Maxillary palpi filiform..... | 7. |
| 7. | Outer spurs of hind tibiae about half the length of inner spurs..... | Omiodes. |
| | Outer spurs of hind tibiae of nearly even length..... | Hellula. |
| 8. | Palpi with the 3rd joint naked..... | Evergestis. |
| | Palpi with the 3rd joint concealed by hair or scales..... | 9. |
| 9. | Posterior tibiae in male with outer middle-spur rudimentary..... | Phlyctaenia. |
| | Posterior tibiae in male with above spur developed..... | 10. |
| 10. | Fore wings with 10 rising out of 9..... | Nymphula. |
| | Fore wings with 10 separate..... | 11. |
| 11. | Face forming a horny prominence..... | Loxostege. |
| | Face without a horny prominence..... | 12. |
| 12. | Middle tibiae in male dilated..... | Mecyna. |
| | Middle tibiae in male normal..... | 13. |
| 13. | Fore wings much narrower than hind wings..... | Nomophila. |
| | Fore wings about same width as hind wings..... | 14. |

14. Palpi very long, tapering.....**Pyrausta**.
 Palpi moderate, loosely scaled.**Protulacistis**.
 Palpi short.15.
 15. Fringe of hairs on lower median vein of hind wings.**Orthomecyna**.
 No fringe as above.16.
 16. Hind wings with veins 4 and 5 closely approximated at base.
 **Promylaea**.
 Hind wings with 4 and 5 not approximated at base..**Mestolobes**.

(XIII) PYRALIDIDAE.

..... **Pyralis**.

(XIV) PTEROPHORIDAE.

- Fore wings with 7 and 9 present, face tufted.....**Platyptilia**.
 Fore wings with 7 and 9 absent face not tufted....**Trichoptilus**.

(XV) ORNEODIDAE.

..... **Orneodes**.

**A revision of the Hemipterous family Nabidae found in the
 Hawaiian Islands.**

BY G. W. KIRKALDY.

The Nabidae have usually been considered a part of the great predaceous family Reduviidae, but constitute a separate family, distinguished by the absence of the stridulatory apparatus on the prosternum, by the distinctly 4-segmentate labium and by the characteristic venation. The ova are inserted, whereas they are deposited externally in the Reduviidae, but the nymphs, as in the latter family, have three odoriferous orifices on the tergites.

The Hawaiian species belong to one genus (though this may, if one wishes, be split up into four subgenera) and indeed, if we except the almost cosmopolitan and certainly immigrant *Reduvius capsiformis*, may very reasonably be considered to have all developed from one original immigrant, possibly indeed from *R. blackburni*.

There is no need to discuss the structure in detail, as there is very little in it of special interest; the venation, however, demands a few words.

The tegminal venation is not at all dissimilar from that of a Zeline Reduviid such as *Triatoma*, except that the membranal veins are continued furcately to the very apex. The costal vein continues to the exterior angle of the apical margin unforked. The subcostal and radial are coalesced (as is common in Heterop-

tera) for about two-thirds of the length of the corium, after which the subcostal continues alone to the apical margin of the corium, meeting the costal there; the radial sector deflects to meet at an angle a fork of the median, the two continuing to the apical margin of the membrane, the median continuing also, rather deflectedly, to the apical margin of the corium. This is the case in such typical forms as *capsiformis*, but the relations of the veins are more obscured in *lusciosus*, &c.

There are several little points which cannot be settled without recourse to freshly emerged specimens, but for systematic purposes, it is sufficient to say that a large area is formed in the basal middle of the membrane which is traversed longitudinally by two submedian veins, which in some species are simple, in others shortly forked. This venation, however, is not of a positive specific value, as variations occur even in the two tegmina of the same specimen.

In the *Nesotyphlias* series, at least in *R. lusciosus*, the venation is very similar, except that the tegmen is much more coriaceous (though the brachypterous form of *R. blackburni* approaches in that respect), and the clavus is not separated, but the length of the main veins is variable, the membrane is very oblique and much shortened. In *R. kaohimani* and its allies, the tegmina are still more reduced.

It is not possible to interpret the wing from that of the mature adult. There are two main, subhorizontal veins (the "primary" and the "subtended"); these do not reach the margin, but are joined about their middle by the "connecting" vein, from the lower half of which arises the hamus (*h*); the claval commissure is accompanied by a vein from which springs an arched one. The uppermost vein is possibly the subcostal (joined basally to the radial), and the next is possibly the median, the hamus representing the radial sector. (Pl. I, f. 11).

The venation is a little reduced in the brachypterous form of *R. blackburni* and much more in *R. nesiotis* (Pl. I, f. 12), while the wing is almost obsolete in the *Nesotyphlias* group and has no appreciable venation.

The males are much slenderer than the females, in which the abdomen is more or less widened laterally in the middle. The ovipositor is very conspicuous. In the males, the pygophor is ornamented by a hook on each side (Pl. I, fs. 1-4), which is articulated close to the apical margin, and in repose lies fairly flat against the body, with the acute end pointing forwards, but can be turned in a sort of socket so that this end can point in the opposite direction. These hooks consist of two parts, which, however, are all of one piece, the "handle" and the "blade."

These homely terms seem to be sufficient for descriptive allusion. There is no doubt, I suppose, but that these hooks are used for gripping the female during copulation, but it is certainly a point for observation and confirmation. The figures are a little diagrammatic, as the parts are rarely in the same plane.

Although, like the Reduviidae, adapted for a life of rapine, the Nabidae are not entirely predaceous, nor indeed are the Reduviidae always. In these islands, nymphs and adults prey on Leaf-hoppers, Aphidae, Psocidae, small Diptera, etc., but *R. capsiformis* also sucks up the sweet secretion of the Asiracid *Perkinsiella saccharicida* (1). Various notes on exotic species have been made; thus the holarctic *R. ferus* has been recorded as preying on the Cecidomyid-fly *Mayetiola destructor* (2); the palaeartic *R. limbatus* on *Tipula paludosa* (3); *R. myrmicodes* on the eggs of the butterfly *Pieris* (4); and *R. apterus* on Aphidae in the gall-crumpled leaves of *Ulmus* (5). Of course these are isolated fragments, but are sufficient to indicate the nature of their food-supply. Like most predaceous Heteroptera, *Reduviolus* can stab pretty severely (6), though it can not obtain the same purchase as the Reduviidae with their firm, hard, beaks. (7).

Exotic species of *Reduviolus* are usually found in mixed, low herbage, grasses, sedges, etc.; one species (*myrmicodes*) on the ground, with ants. In these islands, *R. capsiformis* is found in grasses and weeds in rather dry places as a rule, while in similar situations is found *R. blackburni*, though at rather higher, and in fact wetter, elevations, and more naturally perhaps, among ferns, especially "Staghorn" (*Gleichenia dichotoma*). The species of *Nesotyphlias* are found on the ground and on tree-ferns; the rest are arboreal. The arboreal forms seem to be somewhat restricted in their hunting-trees. *R. kahavalu* is restricted to *Sophora chrysophylla* and seems, so Dr. Perkins informs me, to be the most arboreal of all the species. *R. tarai* is always on *Cyathodes*, though naturally it occurs on other plants which

(1). Perkins, 1903, Bull. Board Agr. Hawaii, I, 19.

(2). Bruner and Swenk, 1907, Bull. Nebraska Agr. Sta., xcvi, 17, f. 4.

(3). Campion, 1905, Entom., xxxviii, 281.

(4). Marchal, 1900, B. S. E. France, 330.

(5). Fieber, 1860, Eur. Hem., 159.

(6). Eardley-Mason, 1889, Ent. Mo. Mag., xxv, 457.

(7). Although none of the Homoptera is known to be predaceous, Mr. Kershaw writes to me, "Did I tell you that whilst at Piroe [in Ceram] sitting in a chair, a nymph of a small Fulgoroid settled on my bare foot, and punctured it and began to suck? Muir saw it."

touch the latter. At Kilauea, Hawaii, I found one of this species on Ohia lehua, but it was a scrub-tree and closely swathed around up to its lower branch by the *Cyathodes*. *R. truculentus* is restricted to *Pipturus* and has not been found elsewhere. The other arboreal forms have been found on *Acacia koa* and *Nani* (*Metrosideros*) *polymorpha*, but also on ferns, etc., when these are around the trees. Thus also while the *Nesotyphlias* forms seem to be ground-feeders, yet they also occur on tree-ferns and other trees when the branches of the latter are in communication with the ground or the shrubbery. They seem to be fond of dead fronds of ferns, whether on the tree or fallen.

The eggs of *Reduviolus* were first described by Swezey in 1905 (8) and the following year by Chapman (9). Those of *R. capsiformis* (blackburni Swezey) are inserted in the midrib of cane-leaves and similar situations. Chapman found the eggs of what was supposed to be *R. myrmicodes* (*lativentris*) inserted in the leaves of *Chlora perfoliata*. These eggs are much like those of *R. capsiformis*, but are more deflected near the micropile end. Their deposition appears also to be more regular than in the latter. Chapman says: "When the egg hatches, it opens by an elaborate lid or stopper being pushed off, or rather out. This lid occupies the whole thickness of the woody layer, and when pushed out leaves the whole of the tube in this layer lined by egg-shell, so that it is more like a stopper in a bottle than a lid. When pushed out it does not fall, but remains attached to the egg by several twisted films, which retain it, at a distance of about half a millimetre, in a position as if its being pushed back into its place were contemplated. This stopper is of a white pith-like texture and highly organized structure. It is a slightly conical tube, with a diaphragm near its inner opening; the outer surface is longitudinally striated. The inside is impressed with hollows in several irregular series, such as might be made, if it were on a larger scale, by making grooves with rounded ends from the edge to the bottom, whilst it was still soft material, by pressure of a finger, then repeating this in a shorter series and again by another, with only the finger tips within the margin. The flat bottom has also a number of upright, slender processes, sometimes branched, half the height of the hollow they are in." This capsule is not unlike, generally speaking, that of certain Reduviids.

The nymphs of our species are not specially interesting. They have three glandular openings, the tarsi are all bisegmentate,

(8). 1905, Bull. H. S. P. Ent., 1, 234, Pl. 17, f. 2-3.

(9). 1906, Ent., XXXIX, 73, Pl. 3.

at least in the later stages, the first segment being minute; the claws are long and subequal. The ant-like appearance of one of the exotic species of *Reduviolus* has been long known, but none of the Hawaiian forms show any resemblance of this nature; they are always found in the same sort of place as their adults. *R. kerasphoros* is recognizable by the thickened first segment of the antennae, but has not the cephalic horns of the adult. *R. tarai* and *truculentus* by their pattern and colouring, as recorded in their specific descriptions further on; *R. subrufus* is very red; *R. capsiformis* is slender and pale yellowish with a percurrent red line down the middle; *R. lusciosus* is brownish yellow; but I have not observed any special structural characters, except in *R. kerasphoros*, with its thickened antennae.

Dr. D. Sharp has described and figured ⁽¹⁰⁾ the nymph of *R. myrmicodes* (under the name of *Nabis lativentris*), showing its ant-like appearance, as before mentioned, and observing "it is strange that this curious case of resemblance should hitherto have escaped notice." As Poulton has also recently ⁽¹¹⁾ written, "It is remarkable that so interesting a form of mimicry in such a common insect should have been undescribed until so late as 1899," it is evident that a summary of the literature will not be out of place here.

In 1834 O. G. Costa described a new species of *Reduviolus* under the name of *Nabis myrmicodes* ⁽¹²⁾; as his description was based upon a nymph, it is allowable to infer that his attention had been drawn to the ant-like appearance of the bug. I have, however, not seen a copy of his rare paper, and do not know the details; I am not even sure that the reference given is correct.

In 1879 O. M. Reuter (who has just recently, after a life devoted to Science, and especially to the Hemiptera, been afflicted by total blindness), published a valuable summary, with much new matter, of what was known on the subject of "Mimicry" in Hemiptera, entitled "Till kannedomen om mimiska Hemiptera och deras lefnads historia" ⁽¹³⁾. With reference to *Reduviolus myrmicodes*, which, according to the nomenclature in vogue at that time, he called "*Coriscus lativentris*," he says: "This species is not a mimic in the adult state, but is an exceedingly good one as a nymph or larva. Nymphs of this have even

(10). D. Sharp, 1899, *Cambr. Nat. Hist.*, VI, 556-7, f. 269.

(11). Poulton, 1908, *Essays on Evolution, 1889-1907*, pp. 257-8.

(12). O. G. Costa, 1834, *Cenni Zool.* xii, 71; (I have not seen this).

(13). Reuter, 1879, *Oefv. Finsk. Förh.*, 1878-9, pp. 141-199, (the notes on *Reduviolus* are on pp. 189-90).

(14). Breddin, 1896, *Zeitschr. für Naturwiss.*, LXIX, 33-5, Pl. I, f. 10.

been described as a separate species by Costa under the name of *Nabis myrmicodes*, having reference to its mimicry of an ant, and indeed very happily so named. In the parks and leafy woods in places around Lille in the north of France, I happened to net, in some shady groves, a considerable number of the nymphs of this species, from 2-4½ millimeters long; in the net with the same were numbers of a *Myrmica*, the species of which I did not determine; these individuals, though systematically so far apart, could scarcely be separated then. Towards the mimicking of the *Myrmica*, there contribute in a high degree the four upright spines in the nymphs, one on each side of the meso- and metathorax; the abdomen is not itself so extraordinarily constricted at the base, but it appears so, by reason of the white spots, placed one on each side at the base. This is the case actually in the young nymphs, which have need of the mimicry, but in the older ones it is less marked, owing to the four white spots above-mentioned disappearing (15). The species has by that time become very big, so that mimicry of an ant would be of utility no longer, as the latter are not so large. The colouring of the small individual is also more in accordance with that of the *Myrmica*. *Coriscus lativentris* is a predaceous bug whose lifehistory, and the nature of its relations with the ants, are as yet unknown."

More recently, Breddin, in a paper entitled "Nachahmungerscheinungen bei Rhynchoten" (14) has also discussed this species. He says: "Figure I shows a blackish-brown insect the proportions of whose body cannot in the least be compared with those of an ant. But through a real stroke of genius on the part of Nature (!) this little animal is wonderfully clothed. On each side of the base of the abdomen there appears a whitish, faintly glittering spot which extends far across the back until the dull ground-colour appears only as a narrow central stripe which is very much like the well-known stalked abdomen of the ants. In order to make the masquerade complete, the plump and conspicuous anterolateral parts of the abdomen are made invisible by the little white spot, and the transformation of the really plumply built insect into a slender ant, is complete.

"This adaptation is very much more marked than in the colouring or the nymphs of the other species of *Nabis*, especially in

(15). They occur in nymphs of 4¾ mill. long, not any longer in those of 6 mill. length.

the very closely allied *N. brevipennis* nothing very strikingly marked is shown. (16).

"The colour-divergence between nymph and imago [in *myrmicodes*] is also usually marked, so that one who is not fully experienced in these matters will take the blackish, white-spotted nymph, and the plain greyish brown adult for two entirely different insects, as indeed an early writer (Costa) has done, in describing the nymph as a separate species under the name of *Nabis myrmicodes*. This marked difference gives us a glance into the mode of life of the bug. While we find the species of *Nabis*, as for example the closely related *N. brevipennis*, as adults and also as nymphs, in herbage and shrubs, we meet *N. lativentris*, on the contrary, with its nymphs, generally crawling on the ground; they are also found among clumps of roots of strong plants, and under stones watching for their prey. They appear especially abundant where forest-ants are plentiful; and have even been found in hills of *Lasius fuliginosus*.

"The *Nabis*-group belongs to the Family Reduviidae [rather, superfamily Nepoideae G. W. K.] consisting of carnivorous insects, which are among the most terrible of predators in the insect world. It is then not to be doubted that these Myrmecophanous nymphs prey upon insects and especially upon ants. Masked by its wonderful 'myrmecophanism,' the *Nabis*-nymph, a wolf in sheep's clothing, steals up to the approaching ant who believes she is being met by a sister-ant, seizes her with the fore legs which are especially well equipped and adapted to catch and retain the prey, and with its awl-shaped and crooked proboscis bores into the body (17). At any rate we have here to do with aggressive mimicry."

(16). "All of the *Nabis*-nymphs known to me show, as indeed is common in the Hemiptera, the colour markings of their adults, usually a purer or darker yellow or, as in *brevipennis*, a monochromatic dark brown, with a slight copper tinge." [Although Breddin is quite mistaken about most of the nymphal Hemiptera being coloured like their adults, his remarks on this in *Reduviolus* are confirmed very largely by my own above on Hawaiian forms. G. W. K.].

(17). Breddin has mixed up the form of the labium in Reduviidae with that in Nabidae. It is also not the labium that bores. I do not believe that the *Reduviolus* preys on the ants. It rather takes advantage of its likeness to the ants to pursue other prey which the ants do not attack, and which therefore would not try to escape, till too late; or perhaps it is left alone by the ants on their marauding expeditions. This is however a subject for observation rather than guessing.

DISTRIBUTION OF HAWAIIAN *Reduviolus*.*

| | SPECIES | Kanai | Oahu | Molokai | Lanai | Maui | Hawaii | HABITAT |
|-----|-------------------------------|-------|---------|---------|-------|-------|--------|---|
| I | <i>capsiformis</i> (20) | * | * | * | * | * | * | grasses, etc., generally in dry places. |
| 2 | <i>blackburni</i> | * | * | * | * | * | * | grasses, sedges, ferns, etc., generally in damp places. |
| 3 | <i>kahavahu</i> | | | | | | * | <i>Sophora chrysophylla</i> . |
| 4 | <i>tarai</i> | * | * | * | * | * | * | <i>Cyathodes tameiameatae</i> . |
| 5 | <i>morai</i> | * | | | | | | (? dead fronds of tree ferns, etc.) |
| 6 | <i>nubigenus</i> | | ? | * | * | * | | ? |
| 7 | <i>koelensis</i> | | * | | * | | | <i>Acacia koa</i> ; <i>Nani polymorpha</i> (21); ferns. |
| 8 | <i>truculentus</i> | | * | | | | | <i>Pipturus albidus</i> . |
| 9 | <i>subrufus</i> | | * | * | | * | * | <i>Nani polymorpha</i> ; dead fronds of tree ferns. |
| 10 | <i>sharpianus</i> | * | | | | | | ? <i>Nani polymorpha</i> . |
| 11 | <i>rubritinctus</i> | | | | | * | | ? |
| 12 | <i>kerasphoros</i> | | * | | | | | <i>Nani polymorpha</i> ; <i>Acacia koa</i> . |
| 13 | <i>lusciosus</i> | | * | | | ? | | |
| 14 | <i>silvicola</i> | | | * | | | | } at roots of grass, ferns, etc, (22) |
| 15 | <i>silvestris</i> | * | | | | | | |
| 16 | <i>pele</i> | | | | | | * | |
| 17 | <i>nubicola</i> | | | | | * | | |
| 18 | <i>procellaris</i> | | | * | | | | |
| 19 | <i>volcanicola</i> | | | | | | * | |
| 20 | <i>kaohinani</i> | | * | | | | | |
| 21 | <i>pahudicola</i> | | | * | | | | |
| 22 | <i>lolupe</i> | | | | | | | |
| 228 | <i>curtipennis</i> | ? | | ? | | | * | |
| | | 6(17) | 9 (710) | 3(78) | 5 | 7(78) | 8 | |

(19a) *nestotes* not included, as the island is not known.

(20) Also in Laysan Island; cosmopolitan. The other species, so far as is known, are precinctive.

(21) Formerly known as *Metrosideros polymorpha*.

(22) These all ascend trees incidentally, when these are shrubby, and surrounded by ferns, &c., which intermingle with their lower branches.

Little else is known of the habits of *Reduviolus* and its allies. Scott has described a neotropical genus (18) of which the species live en famille with colonies of Spiders. *R. capsiformis* is found plentifully here in dry grass with the little introduced Spider *Erigone vagans*, but I have not observed any such habits as those related by Scott.

Very little is known of the parasites of Nabidae, in fact the only record of which I know is that, by Swezey, of *R. capsiformis* by the Mymarid *Polynema reduvioli*, one to each egg (19).

We see (22a) that three species each are apparently peculiar to Kauai, Oahu, Molokai and Hawaii; and two to Maui, while none is peculiar to Lanai; three are throughout the islands, one of the latter indeed being almost cosmopolitan.

REDUVIOLUS W. Kirby (1837).

All the Hawaiian forms fall at first under the typical subgenus (*except that some of them which are undoubtedly sprung from one of the others, have annulated antennae*), inasmuch as they are characterized by the head not being strongly narrowed behind the eyes, by the wing-hook originating from the "connecting vein" close to the "subtended vein," and by the urosternites lacking denuded patches and being well limited from the uropleurites (23).

For those forms which are apparently always brachypterous (almost apterous), and which lack ocelli or have them only very minute, the pronotum scarcely wider basally than medially, etc., I have proposed a mutation-name, *Nesotyphlias*. It is not strictly a genus, or even perhaps, a subgenus, in an exotic sense, but it is certainly not equivalent to the ordinary brachypterous forms of the genus in Europe and North America. The Hawaiian Fauna is very peculiar and must be treated in a special manner.

As there is not the slightest chance that any of the forest, endemic, forms will be found elsewhere, I have tried rather to

(18). 1881, Ent. Mo., Mag., XVII, 272.

(19). 1905, Bull. H. S. P. Ent., I, 235.

(22a). By the table on p. 56.

(23). Previously, I have used the terms "sternites," "pleurites," etc., in this connection, but the fact that, strictly, the parts of the sterna, nota and pleura are sternites, tergites and pleurites, respectively though not usually so termed, renders it advisable to prefix Packard's "uro", when abdominal parts are to be indicated. "6th urosternite" is evidently less cumbersome than "6th ventral segment of the abdomen."

give the characters by which the different species seem to differ from one another, than to describe them at great length and distinguish them from exotic forms. In some, I might almost say, most, of the forms, I have had very insufficient material, and there is still room for a good deal of work in collecting and studying both adults and nymphs.

TABLE OF HAWAIIAN SPECIES.

This table will, I believe, aid considerably in determining the species, but it is little use trying to work out these difficult forms from single examples, in many cases, especially females (24).

- 1(24). Tegmina well developed; membrane wide, reaching well beyond the apex of the abdomen; wings at least one-third of the length of the abdomen; ocelli normal.
- 2(7). Lateral margins of the pronotum only slightly sinuate, those of the hind lobe not suddenly diverging, hind margin not twice as wide as the collar
- 3(6). Scutellum with a median dark line down the middle; at least the hind femora apically dark.
- 4(5). Elongate, slender, pale testaceous, tegmina not lightly punctured, nor speckled with fuscous; fore femora obsolescently marked with yellowish-brown; veins of median areas of membrane usually simple; male hook with dorsal margin (as seen in profile at rest) of the blade strongly rounded, ventral side strongly rounded, ventral side slightly emarginate.....
.....1. *capsiformis* (Germar).
- 5(4). Less elongate and stouter, ashy-grey, tegmina lightly punctured or speckled with fuscous; fore femora more strongly marked with fuscous; vein of median area of membrane usually forked; male hook with the dorsal margin of the blade fairly straight, the ventral strongly bidentate.....
.....2. *blackburni* (F. B. White).
- 6(3). Scutellum and legs immaculate [subg. *Nesomachetes*].....
.....3. *kahavalu* Kirkaldy.
- 7(2). Lateral margins of the pronotum distinctly sinuate, those of the hind lobe suddenly diverging; hind margin more than twice as wide as the collar.
- 8(9). Tegmina not or scarcely punctured, nor speckled with fuscous; veins of the median area of the membrane scarcely forked; pronotum with the hind lobe not raised strongly (as seen in profile)4. *tarai* Kirkaldy.
- 9(8). Tegmina distinctly punctured or speckled with fuscous, especially near the exterolateral angle of the corium; veins of the median area of the membrane shortly forked; hind lobe of pronotum distinctly raised.
- 10(5). First segment of antennae shorter than the head.
- 11(14). Colours of corium not sharply contrasted; length not more than $8\frac{1}{2}$ mill.

(24). 13 nesioties is not included.

- 12(13). Hind lobe of pronotum with 5 longitudinal lines; membrane normal5. *morai* Kirkaldy.
- 13(12). Hind lobe of pronotum not clearly lined; veins of the median area of the membrane more or less broken up, partly forming spots and drops.....6. *nubigenus* Kirkaldy.
- 14(11). Corium basally clear yellow, apically bright reddish; length 4 mill.....10. *sharpianus* Kirkaldy.
- 15(10). First segment of the antennae distinctly longer than the head.
- 16(21). First segment of the antennae not thickened.
- 17(18). Cinereous, very heavily marked with blackish-grey.....8. *truculentus* Kirkaldy.
- 18(17). More or less tinged with reddish.
- 19(20). Slender, elongate, cinereous, tinged with red; hind margin of pronotum slightly emarginate..7. *koelensis* (Blackburn).
- 20(19). Stouter, always distinctly ruddy; hind margin of pronotum truncate.....9. *subrufus* (F. B. White).
- 21(16). First segment of the antennae very distinctly thickened.
- 22(23). Head normal(?).....11. *rubritinctus* (Blackburn).
- 23(22). Head anteriorly with a blunt spine on each side [subg. *Milu*]12. *kerasphoros* (Kirkaldy).
- 24(1). Tegmina elongate, narrow, or else very short; clavus not separated; membrane short; wings halter-like; ocelli absent or very minute.....[subg. *Nesotyphlias*].
- 25(28). Antennae with a single annulus near the apex of the second segment.
- 26(27). Tegmina extending practically to the apex of the abdomen. 13. *lusciosus* F. B. White; 14 *silvicola* Kirkaldy; 15 *silvestris*, sp. nov.; 16 *pele*, sp. nov.; 17 *nubicola*, sp. nov.; 18 *procellaris* Kirkaldy.
- 27(26). Tegmina extending to about three-fourths of the abdomen.20. *volcanicola* Kirkaldy.
- 28(25). Second segment of antennae multiannulate.
- 29(30). Tegmina about three times as long as scutellum, apically angularly rotundate.
- 30(31). First segment of antennae pale, scarcely annulate, basal half fuscous; anterior lobe of pronotum gently rounded, not forming an angle with hind lobe....21. *kaohinani*, sp. nov.
- 31(30). First segment of antennae multiannulate; posterior lobe of pronotum convex, in profile forming an angle with the hind lobe22. *paludicola* Kirkaldy.
- 32(29). Tegmina a little more than twice as long as the scutellum, apically broadly rotundate.....23. *lolupe* Kirkaldy.

1. *capsiformis* (Germar).

Nabis capsiformis (Germar 1837) Reuter 1908 Mém. Soc. Ent. Belg., XV, 114 (with exotic synonymy).

N. innotatus F. B. White, 1877, A. M. N. H. (4) XX, 112.

Reduviolus blackburni Kirkaldy, 1902, Faun. Haw., II, 155 (part); Swezey, 1905, Bull. H. S. P. A., Ent. I, 234, Pl. 17, f. 1-4.

Pale greyish or yellowish-testaceous, with two or three small spots along or near the apical margin of the corium. The dark markings on the head, pronotum, legs and underside are very variable in hue and extent, but are nearly always comparatively slight. The forms living in dry, lower localities, near the coast, are very light coloured, with more elongate, flimsy tegmina, but those occurring at higher and wetter elevations are darker, and the tegmina are shorter and stouter; these last approach *koelensis* somewhat, but the latter is at once distinguished by the much broader hind lobe of the pronotum, and the species is arboreal. The dark forms of *capsiformis* also approach the light forms of *blackburni*, but the male hooks are very different. (Pl. I, f. 1).

R. capsiformis is practically cosmopolitan and is apparently distributed over all these islands at all elevations I have also seen specimens from Laysan. Superficially it is not unlike the immigrant Mirid *Oronomiris hawaiiensis* and is found in the same situations, viz: grasses, sugar-cane, etc.

2. *blackburni* (White).

Nabis blackburni F. B. White, 1878, A. M. N. H., (5), I, 373.

Reduviolus id. Kirkaldy, 1902, op. cit. 155 (pt.).

This species, as above remarked, is very much like dark *capsiformis*, but is darker, ashy-grey, and while in *capsiformis* the *wrotergites* are pale, (perhaps a little fuscous in part), in *blackburni* they are blackish with red or yellowish pleurites. Some specimens from Hawaii, Lanai and Maui, at higher elevations, are redder and much darker and have a superficially very different habitus, but I can find no specific differences.

At the higher elevations, are found forms with much shorter tegmina (f. 17 representing the tegmen of a female I found at Kilauea, Hawaii; the membrane of the longer form of tegmen is shown at f. 16). This form tends to bridge over the distance towards *lusciosus*. In all, the male hook is very characteristic (f. 2). The wing is shown at f. 11; that of the short-winged form is not very different, beyond the shortness.

R. blackburni is distributed over all these islands at all elevations, more commonly perhaps, at 2000 ft. and over; I do not know it from any other country, but I am not convinced that it is endemic. It is to be found in grasses, sugar-cane, stag-horn fern, etc., and may be beaten from low Ohias and other trees, but I think that it is in the trees only accidentally.

The nymph, when living, is dark purplish-brown above, more or less variegated; scutellum yellow behind. Beneath pale yellow, abdomen apically more or less fuscate. Femora annulate near the apex. Pleurites spotted with reddish.

3. *kahavalu* Kirkaldy.

Reduviolus innotatus Kirkaldy, 1902, Faun. Haw. III, 154, Pl. 5, f. 32, (not Blackburn).

R. kahavalu Kirkaldy, 1907, P. H. E. S., 1, 156, (new name).

Male, female. Very pale greenish (turning yellowish after death), practically immaculate, the urotergites more or less fuscous. Antennae testaceous, sometimes light fuscous. Tegmina translucent, slightly tinged with greenish, opalescent, membranay veins ashy. Eyes medium-sized, not occupying the whole of the head in profile. Second and third segments of the antennae subequal in length, twice the length of the head in profile, and about one-half longer than the first segment, 4th. slightly longer than the first. Fore femora subequal in length to the head, pronotum and scutellum together. The veins of the median area of the membrane are not forked, (f. 14). The wing-hook arises from the connecting vein, almost at its junction with the subtended vein. Pronotum with the lateral margins almost straight, scarcely divergent, the hind lobe not, or scarcely, elevated, (figs. 5 and 8). The characteristic male hook is shown in fig. 3.

Length, $9\frac{1}{2}$ - $10\frac{1}{2}$ mill.

Hab: Hawaii, Kona, 2000-6000 ft. (July-Aug.); Kilauea (Aug.), on Mamani (*Sophora chrysophylla*, one of the Leguminosae).

This species seems to be restricted to Hawaii, the record in the "Fauna Hawaiiensis" from Waianae, Oahu, being referable to *R. capsiformis*. The only examples of *R. kahavalu* that I have seen are those collected by Dr. Perkins, and referred to above.

4. *tarai* Kirkaldy.

Reduviolus tarai Kirkaldy, 1902, Faun. Haw., III, 154, Pl. V, 40, (male hook).

R. kaonohiula Kirkaldy, 1908, Proc. Haw. Ent. Soc., I, 192.

Male, female, purplish-brown, more or less suffused with sanguineous, especially on the legs and tegmina. Antennae testaceous, more or less tinged with fuscous or sanguineous. Scutellum bluish-black, bright red laterally. Lateral margins of tegmina narrowly yellowish. Meso- and metapleura bright red, marked with black. Membrane colourless or milky, veins pale ashy. Fore femora reddish, middle and hind femora yellowish, apically reddish, the tibiae and tarsi yellow, etc. Abdomen above fuscous more or less discally, pleurites yellowish or sanguineous; abdomen beneath yellowish. The eyes are larger than in *R. kahavalu*, breaking the dorsal line in profile. Head about as long as the first segment of the antennae or very slightly longer and very slightly shorter than the fourth segment; second and third segments subequal, each about three-fifths longer than the first. Pronotum with lateral margins of hind lobe somewhat divergent, and

a little raised. Fore femora slightly more incrassate than in *R. kahavalu*. Membranal venation much as in the latter, but the medial veins are more parallel.

Length, $8\frac{1}{2}$ -10 mill.

Hab. Oahu, Waialua, Koolau range (March); Molokai, 3000 ft. (June); Lanai, 2000 ft. (Feb.); Hawaii, Kona, 5000 ft. (June), collected in these places by Dr. Perkins. I have also taken it on Hawaii, Kilauea (Nov. and May), on Pukeawe (*Cyathodes tameiameiae*, one of the Epacridaceae), in company with the Asiracid *Nesosydne cyathodis* Kirkaldy.

There were some mistakes in my original description, which can be corrected by reference to the above.

This species and the next hold a sort of intermediate position between *R. blackburni* and the *subrufus* series; the base of the pronotum is more than twice as wide as the collar but is not noticeably raised. *R. tarai* is easily recognized by its immaculate red or reddish tegmina; the antennae and legs are not annulate or at most very indistinctly. The veins of the median area of the membrane are simple. All the examples I have collected are very red, most of them fading considerably later on, but Dr. Perkins tells me that the pale forms are met with. The type of *kaonohiula* is very bright red, the membrane being opaque milky.

The type was a specimen from Lanai, the type of *kaonohiula* being from Hawaii.

The male hook was figured in the "Fauna Hawaiiensis."

The nymph in the last instar is rather pretty when alive, being clear pale green, marked with rosy, and harmonizes well with the colouring of its host-plant.

var. *montivaga* Kirkaldy.

Reduviolus montivagus Kirkaldy, 1908, P. Haw. E. S., I., 192.

This differs from the typical form by the immaculate yellow pleura, etc. It was collected in the Waimea Mts., Kauai. It may be a good species, but I have not seen males.

5. *morai* Kirkaldy.

Reduviolus morai Kirkaldy, 1902, Faun. Haw., III, 155, Pl. 5, f. 39 (not 39a).

This species was sufficiently accurately defined in 1902, except that the last three lines should be deleted, as the annulations of the legs are rather obscure. It is, with the next, readily recognizable by its stouter form and short first segment of the antennae, and by the closely spotted tegmina, but is distinguishable

from *nubigenus* by the longer pronotum and by the different venation of the membrane.

It is apparently restricted to the Mountains of Kauai.

6. *nubigenus* Kirkaldy.

Reduviolus nubigenus Kirkaldy, 1908, P. Haw. E. S., I, 191.

All of the *R. morai* recorded in the "Fauna Hawaiiensis" from localities other than Kauai, belong to this, though "Oahu" requires confirmation, as I have no specimens from this island now to examine. I suppose that f. 39a refers to this species, but I have no males now before me. Pl. I, f. 15, shows the characteristic membranous venation.

7. *koelensis* (Blackburn).

Nabis koelensis Blackburn, 1888, Proc. Linn. Soc. N. S. Wales (2), III, 352.

In the "Fauna Hawaiiensis," I considered this to be a synonym of *R. subrufus*, but it seems to be constantly slenderer, and scarcely, if at all, tinged with red, and the male hook seems a little more rounded dorsally. This and the following long-winged forms are easily distinguished by the lateral margins of the hind lobe of the pronotum being considerably divergent posteriorly, the hind margin being distinctly more than twice as long as the collar (fig. 6); the first segment of the antennae is distinctly longer than the head (except *R. sharpianus*).

I have, since 1902, seen only some specimens taken by myself in Oahu, from Koa (*Acacia koa*) in Nuuanu Valley (about 1000 ft.) and from Ohia lehua (*Nani* [*Metrosideros*] *polymorpha*, one of the *Myrtaceae*) on Tantalus (about 1750 ft.). Blackburn's type was from Lanai, Koele.

8. *truculentus* Kirkaldy.

Reduviolus truculentus Kirkaldy, 1908, Proc. Haw. Ent. Soc., I, 191.

R. subrufus Kirkaldy, 1902, Faun. Haw., II, Pl. V, f. 38.

This species (whose membrane is shown on f. 13) can easily be distinguished from *R. koelensis* by its greater bulk and much heavier markings; the pattern and colouring will separate it at once from *R. subrufus*. It seems to be restricted to Oahu, on the Honolulu Mts., and is found on Mamake (*Pipturus albidus*, one of the *Urticaceae*).

The living nymph of the final instar is of a very pale greenish of the same tint as the underside of the *Pipturus*-leaves, but after death, the greenish tint changes into pale yellowish. The apical lobe of the head, the legs, etc., are whitish translucent; antennae, clypeus, etc., tinged with orange. On the fore and middle femora there is a pale fuscous-red subapical annulus and a similar bright red one on the hind pair. The lateral margins of the hind lobe of the head and the hind margin (medially interrupted) of the pronotum, a short line exteriorly and one interiorly, on the tegminal pads, greenish-grey. Abdomen above with an irregular dark fuscous stripe down the middle, a bright red spot on most of the segments in the middle.

9. *subrufus* (White).

Nabis subrufus F. B. White, 1877, A. M. N. H., (4) XX, 112.

N. oscillans Blackburn, 1888, Proc. Linn. Soc., N. S. W., (2) III, 352.

Reduviolus subrufus Kirkaldy, 1902, Faun. Haw., III, 156, Pl. 5, f. 37.

R. arrogans Kirkaldy, 1908, P. Haw. E. S. I.

Eliminating *truculentus* and *koelensis*, my remarks in the "Fauna Hawaiiensis" still hold. The emargination of the hind margin of the pronotum is a variable character, as I have taken specimens off the same tree, some with truncate margin and some with emarginate; the amount of infuscation and the membranous venation also vary. *Arrogans* is, now I think, simply a darker form with simpler venation. I separate, however, as a variety (*melemele*), a rather polished, yellow form from Maui, (Haleakala), which seems to have all the specific characters of *subrufus*, but of which I have seen only females.

R. subrufus is distributed all over Oahu, Molokai, Maui and Hawaii (and probably Lanai), in the forest region, and frequents Ohia lehua (*Nani polymorpha*).

The type of *subrufus* was from Oahu, that of *oscillans* from Hawaii (Kilauea), and that of *arrogans* from the Molokai Mts., but I have taken an identical specimen of the latter with typical ones in Hawaii (Kilauea).

I have figured the male hook (f. 4).

10. *sharpiannus* Kirkaldy.

Reduviolus sharpiannus Kirkaldy, 1902, Faun. Haw., III, 156, Pl. 5, f. 36.

I have not seen a male of this species, which is restricted to Kauai. The coloring and short antennae will distinguish it among the *subrufus*-series.

11. *rubritinctus* (Blackburn).

Nabis rubritinctus Blackburn, 1888, op. cit., 351.

This species is still unknown to me, as I do not think Blackburn would have overlooked the head-spines. It may be that it forms, by the possession of thickened antennae, a link between the typical *subrufus*-forms and the subgenus *Milu*.

12. *kerasphoros* (Kirkaldy).

Reduviolus rubritinctus Kirkaldy, 1902, Faun. Haw., III, 157, Pl. 5, f. 33.

Milu kerasphoron Kirkaldy, 1907, Canad. Ent., XXXIX, 248.

M. kerasphoros Kirkaldy, 1908, P. Haw. E. S. I., 195.

This species seems to be restricted to Oahu, but is found all over its forest region, on Ohia lehua (*Nani polymorpha*) and Koa (*Acacia koa*). The form with red and yellow tegmina, sharply contrasted, is typical; for that with purplish tegmina, I have proposed the varietal name *purpurea* (P. Haw. E. S. I.).

I erected for this, the genus *Milu*, but I now agree with Reuter that it is not worthy of more than subgeneric rank. (Reuter, 1908, Mém. Soc. Ent. Belg., XV, 109).

The nymphs display the thickened antennae, though less (and more regularly) so, but the head-spines are not apparent.

13. *nesiotes* sp. nov.

This has the general appearance of a short-winged blackburni, but the female abdomen is more like that of *subrufus*. It is larger and darker than *blackburni*.

Sordid brownish testaceous, a black line from clypeus to posterior angle of scutellum, etc. Tegmina yellowish-brown, irregularly suffused with fuscous, membrane much as in *blackburni* (short-winged form). Abdomen pitchy black; tergo-pleurites obscurely spotted with yellow-brown. In brachypterous *blackburni* the wing-venation is nearly the same as that of the normal form, except that it is shortened, but in *nesiotes*, the wing-venation is much reduced, (Pl. I, f. 12).

Length, $9\frac{1}{2}$ mill.

Hab. Hawaiian Isles (? locality).

I have only fragments of a single female, and have described it only because it appears to me not to be conspecific with any other form; and to be worthy of record on account of the wing reduction.

14. *lusciosus* (White).

Nabis? lusciosus F. B. White, 1877, A. M. N. H., (4), XX, 112.

- N. lasciosus* Letheirry and Severin, 1896, Cat. Hém., III, 210.
Reduviolus lasciosus Kirkaldy, 1902, Faun. Haw., II, 157, Pl. V, f. 35; Reuter, 1908, Mem. Soc. Ent. Belg., XV, 124.
R. monticola, Kirkaldy, 1908, P. H. E. S., I, 192.

Male, elongate oval, pale brownish yellow, a percurrent line from base of vertex to posterior angle of scutellum, dark fuscous; this latter is double on the middle lobe of the pronotum, and there is a varyingly pronounced fuscous oblique line on each side of the posterior lobe, meeting this double line at the base of the middle lobe. The tegmina are variable, usually they are almost immaculate, but may be darker, or even a little reddish tinged, and marked with fuscous; they are lightly and sparsely punctured with fuscous, but more closely along the subcostal cell. Membrane pale cinereous, veins a little darker. The antennae are yellowish, as regards the first two segments, a blackish annulus near the apex of the second; the others dark fuscous. The legs are yellowish, the base of the hind femora, a few faint mottlings on all the femora, apex of tibiae, etc., fuscous. Urotergites fuscotestaceous, the pygophor yellow, a spot on the apex and a line down the middle near the apex, blackish; the pleurites are yellowish, not chequered, but have a sanguineous line down the middle. Sternites and mesoternum yellowish, the lateral margins broadly dark fuscous or blackish. The first and fourth segments of the antennae are subequal, each also subequal to the length of the head in profile; the second and third segments of the antennae are subequal, and each about one-half longer than the first. The labium extends to the middle coxae. The eyes do not occupy the whole of the head, either dorsally or ventrally in profile. Pronotum very slightly elevated, (fig. 7). Tegmina elongate, slightly rounded exteriorly, apical angle of corium extending as far as the apex of the abdomen, acute; membrane extending well beyond the abdomen, narrow, much longer than wide, the basal angle formed by the two membranes in repose, acuminate, (fig. 18). Blade of hook broad, semi-circular, angulate apically and dorso-basally.

Female very similar to the male, but the abdomen is wider, exposing the pleurites about the middle; the pleurites yellow, with a fuscous spot on the outer half of each segment basally, this spot not extending to the inner margin.

Length: Male, 10 mill.; female, 10½ mill.

Hab. Oahu, all over the Koolau range, or at least the southern part. I have also seen an example from West Maui, that I cannot separate. It may often be beaten from *Acacia koa* and *Nani polymorpha*, as also from various Ferns, but it seems to be really a ground species, like all its subcongeners, and is common in the grass on the top of Mt. Tantalus, at 2000 ft.

15. *silvicola* Kirkaldy.

Reduviolus silvicola Kirkaldy, 1908, P. Haw. E. S. I.

This is doubtfully valid, only a single female being known, but it is more elongate, and darker than *lasciosus*, and the pro-

notum seems proportionately longer, especially the middle lobe.

Length, $10\frac{1}{2}$ mill.

Hab. Molokai.

16. *silvestris* Kirkaldy.

Reduviolus silvestris Kirkaldy, op. cit., 194.

Closely allied to *lusciosus*, but differs as follows: Darker, and the legs more mottled. Eyes a little larger, breaking the dorsal line of the head in profile; the second segment of the antennae is only a third longer than the first. The tegmina are much shorter, not quite reaching to the apex of the abdomen. In the female (the only sex I have seen), the spot on the tergopleurites extends across from the outer to the inner margin.

Length, $8\frac{1}{2}$ mill.

Hab. Kauai, 4000 ft.

17. *pele*, sp. nov.

The male has the form and general colouring of *lusciosus*, but is much smaller, and the fore lobe of the pronotum is a little more convex. The tegmina are less elongate, scarcely extending beyond the apex of the abdomen. The eyes are also distinctly larger in proportion, while the hook is different.

The female is much darker than the corresponding sex of *lusciosus* and the fore lobe of the pronotum is more convex.

Length, $7\frac{1}{2}$ (male)- $8\frac{1}{2}$ (female).

Hab. Hawaii, Kona, (2000 ft.). Oloa, (Perkins); Kaumana in Hilo, (2000 ft, Swezey); Kilauea, 4000 ft., Kirkaldy, off *Cibotium*.

18. *nubicola*, sp. nov.

Of this I have not seen a male; the female differs from *lusciosus* by the lateral margins of the pronotum being more divergent behind, and the fore lobe more convex. The membrane is shorter and more divergent interoapically, lateral margins straight or slightly emarginate. The basal segment of the antennae has faint fuscous annulations.

Length, 8 mill.

Hab. Maui, Haleakala, (5000 ft., Perkins).

19. *procellaris*, sp. nov.

Male yellowish-brown, the central line dark blackish-brown, thick, the hind lobe with 5 longitudinal lines. Gula and genae blackish. Tegmina yellow-brown, blotched and spotted (especially inwardly) with blackish-brown, posterior margin of corium very irregularly sinuate. Legs more darkly spotted than in *lusciosus*, etc., coxae mostly black. Abdomen dark fuscous, or blackish, ventrally paler down the middle; pleurites yellow-brown, marked with black.

Length, male, $9\frac{1}{2}$ mill.

Hab. Molokai, 4500 ft.

20. *volcanicola* Kirkaldy.

Reduviolus volcanicola Kirkaldy, 1908, P. Haw. E. S., I, 193.
R. lusciosus Kirkaldy, 1902, Faun. Haw., III, Pl. V, figs. 34
 and 34a.

Hab. Hawaii, Kilauea.

21. *kaohinani*, sp. nov.

Male distinguished from *paludicola* by the gently-rounded anterior lobe of the pronotum and from *lolupe* by the longer tegmina. It is distinguished from both by the much slenderer form. Tegmina fuscous, a pale streak on the basal three-fourths of the costal margin; veins more or less pale. The first segment of the antennae is scarcely annulate.

Length, $8\frac{1}{2}$ mill.

Hab. Oahu, Tantalus, about 2000 ft., a single specimen, taken by Mr. Swezey, is in my collection.

22. *paludicola*, sp. nov.

Distinguished from the other species (except *lolupe*) by the multi-annulate first segment of the antennae, and the very short tegmina. Anterior lobe of pronotum convexly raised (f. 10), confusedly fuscous; hind lobe with 5 fuscous longitudinal lines. Clavus yellowish-cinereous; corium pale reddish-fuscous; the minute membrane whitish, with a fuscous, inner spot. Hind tibiae annulate. Abdomen blackish, more or less reddish partly; pleurites chequered, blackish red and yellow.

Length: Male, 10 mill; female, a little less.

Hab. Molokai, 4000 ft., (July 12 and Sept. 27).

23. *lolupe*, sp. nov.

Female very close to the last, but larger and the legs less darkly mottled, while the tegmina (and membrane) are shorter. Brownish-yellowish; eyes black; a broad lateral piceous stripe beneath from apex of head to apex of abdomen, leaving, however, a pale space around the eyes beneath. Legs less noticeably annulate with paler fuscous. Abdomen above brownish tinged with red, tergopleurites brownish-yellow, partly suffused with sanguineous.

Length, $10\frac{1}{4}$ mill, max. width, $3\frac{1}{4}$ mill.

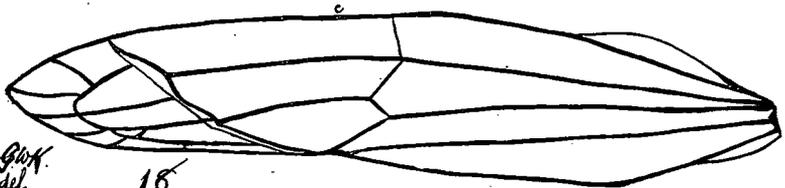
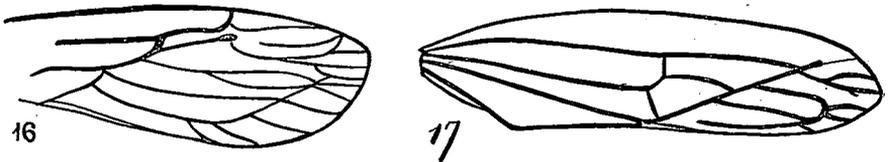
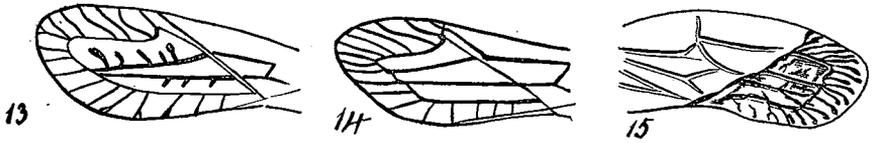
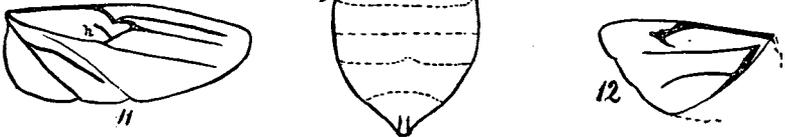
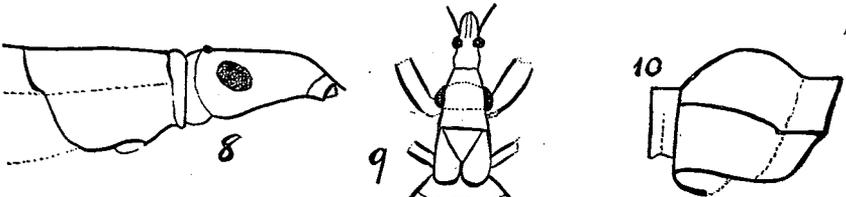
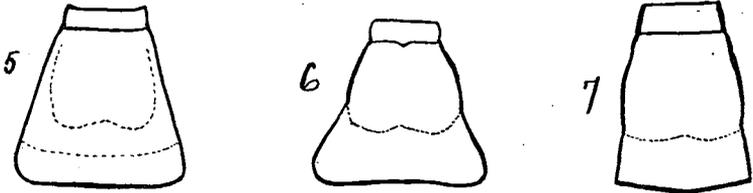
Hab. "Kauai? Molokai?"

A rough outline is shown on fig. 9.

24. *curtipennis* (Blackburn).

Nabis (?) *curtipennis* Blackburn, 1888, P. Linn. S. N. S., Wales, (2), III, 353.

"Apterus; oblongo—ovatus; pallide testaceus fusco vel nigro variegatus; abdomine supra (segmentis apicalibus fuscis exceptis) rufo,



infra fusco rufo et testaceo variegato; hemelytris abdominis apicem haud attingentibus.

Length, $7\frac{1}{2}$ mm.

"Allied to *N. (?) lusciosus*, White. The thorax is thickly blotched with blackish colouring, and the legs are conspicuously annulated with the same colour. The hemelytra [tegmina] do not quite reach the apex of the hind body.

"A single specimen occurred near Waimea, Hawaii."

This species is scarcely identifiable without the type for inspection.

NEW FORMS DESCRIBED IN THIS PAPER.

- Reduviolus nesiotus*, sp. nov.
R. subrufus, var. *melemele*, nov.
R. pele, sp. nov.
R. nubicola, sp. nov.
R. procellaris, sp. nov.
R. kaohinani, sp. nov.
R. paludicola, sp. nov.
R. lolupe, sp. nov.

EXPLANATION OF PLATE I.

- Fig. 1. *Reduviolus capsiformis* (Germar), male hook.
 Fig. 2. *R. blackburni* (White), id.
 Fig. 3. *R. kahavalu* (Kirkaldy), id.
 Fig. 4. *R. subrufus* (White), id.
 Fig. 5. *R. kahavalu* (Kirkaldy), pronotum.
 Fig. 6. *R. koelensis* (Blackburn), id.
 Fig. 7. *R. lusciosus* (White) male, id.
 Fig. 8. *R. kahavalu* (Kirkaldy), in profile.
 Fig. 9. *R. lolupe* (Kirkaldy).
 Fig. 10. *R. paludicola* (Kirkaldy), pronotum in profile.
 Fig. 11. *R. blackburni* (White), wing of macropterous form.
 Fig. 12. *R. nesiotus* (Kirkaldy), wing.
 Fig. 13. *R. truculentus* (Kirkaldy), membrane.
 Fig. 14. *R. kahavalu* (Kirkaldy), id.
 Fig. 15. *R. nubigenus* (Kirkaldy), id.
 Fig. 16. *R. blackburni* (White), id. (of macropterous form).
 Fig. 17. The same, tegmen of brachypterous form.
 Fig. 18. *R. lusciosus*, membrane.

Note on a genus of Californian Tetigoniidae (Hemiptera).

BY G. W. KIRKALDY.

In 1902 (Can. Ent., XXXIV, 19), Ball placed his new genus *Pagaronia* near *Errhomenellus* and *Tetigonia*, and remarks, "this is a very puzzling form and seems in several characters to connect the Tettigoniidae with the Jassidae through some of the lower forms in that group," (p. 21). In my opinion, the genus belongs to the Iassini (cf. Kirkaldy, 1907, Bull. H. S. P. Ent., III, p. 73), and should be placed not very far from *Iassus* Fabricius, the structure of the head, the venation, and the genitalia being sufficiently characteristic. It is to be noted that the Iassini are apparently not "low" forms, but are rather to be placed at the end of the Tetigoniidae (Jassoidea of Van Duzee), and considered as the best-developed forms.

A single male of *P. 13-punctata* Ball was collected in California, Santa Barbara foothills, (June, 1907), by Mr. W. M. Giffard, which may be called var. *octopunctata* nov., differing from the typical form by the absence of the facial spots near the ocelli, and of the pronotal spots; the male plates are three times as long as the apical urosternites.

The roundly emarginate lateral margins of the pronotum near the eyes give this form a very Fulgoroid appearance, not at all unlike that of some Achilini.

In the same locality, Mr. Giffard found also *Paropulopa interrupta* Ball, a small Cicadoid.

JANUARY 7th, 1909.

The forty-seventh regular meeting of the Society was held in the usual place.

NOTES AND EXHIBITION OF SPECIMENS.

Mr. W. M. Giffard exhibited a single male specimen of *Odynerus vulcanus* taken by him on Tantalus, Oahu, at 1500 feet elevation. Dr. Perkins who had examined the specimen informed Mr. Giffard that it was absolutely typical with the same species which is not uncommon on the Island of Hawaii. As *O. vulcanus* is not ordinarily taken on any other island than Hawaii the specimen taken by Mr. Giffard must be considered as having been either accidentally introduced or blown over from the adjacent isle.

Mr. Kuhns exhibited a specimen of *Periplaneta australasiae* which he chloroformed in the act of oöthecaposition showing the case partly extruded.

Mr. Giffard asked whether the beetle-roach (*Eleutheroda dytisoides*) which infested cypress trees was viviparous or not. Mr. Swezey thought it was.

Mr. Wilder reported finding the uncommon roach, *Rhyparobia maderae*, in a store on Maui. Mr. Swezey had taken three specimens sometime ago, one in Pahala, Hawaii, one in Kekaha, Kauai, and one in Honolulu.

Mr. Fullaway reported finding the eggs of *Holochlora venosa* in the stems of mangoes. Mr. Giffard said the insect was quite common in Nuuanu, having been collected by Mr. Jordan and himself. He believed the eggs to be heavily parasitized.

Mr. Swezey exhibited a portion of a *Polistes* nest, collected amongst the glue bushes of Kaimuki, near Diamond Head. In this nest, inserted amongst the papery substance of the nest were two eggs of *Elimaea appendiculata*, a large green locustid which normally deposits its eggs in leaves of plants, inserting them at the edge between the upper and lower layers of the leaf.

Mr. Fullaway exhibited five species of Bruchids which he had bred from various kinds of beans. He also exhibited a specimen of *Coccinella abdominalis*, the rarity of which he thought likely to be due to its being parasitized.

Mr. Kirkaldy exhibited three drawers of Hemiptera, as part of a large collection made incidentally by Mr. Muir in the Malay Archipelago while searching for parasites.

FEBRUARY 4th, 1909.

The forty-eighth regular meeting of the Society was held in the usual place.

NOTES AND EXHIBITIONS.

Mr. Kotinsky exhibited specimens and presented the following note on *Eleutheroda dytisoides*. "Sunday, December 20, 1908, I observed a specimen of this roach with a strange white appendix projecting behind, running about the house, where the insect is a common nuisance. Upon capturing the specimen she parted with the appendix, which upon examination, turned out to be a batch of embryos. An attempt to breed some of these failed." This observation is proof of the species being viviparous.

Mr. Kotinsky expressed the need of a Field Naturalists' Club. He stated that there are many youths in the city who make excursions to the mountains and that if they had proper guidance and instructors to accompany them good results would be obtained. The subject was discussed by those present.

PAPER READ.

Takahashia japonica (?) Ckll., a Coccid, new to Hawaii.

BY JACOB KOTINSKY.

My friend, Mr. J. Kidwell, has a very prolific pepper tree in his yard. Some time ago he brought me larvae and pupae of *Lycaena* collected on the plant. Recently he found a large colony of the above Coccid on the same bush, and brought me specimens for identification. They were thickly scattered over leaves and twigs, many young just hatching and setting down for business. Careful inspection of the premises failed to disclose another host, nor could Mr. Kidwell suggest a clue to the possible origin of the insect in his yard. After saving material for the collection I had the balance burned, and hope now the possible pest is exterminated.

Prof. Cockerell¹ characterizes this genus as follows: "Similar to ordinary *Pulvinaria* in general structure, but forming a very long, firm, cottony ovisac, which projects from the twig in a curve about 17 mm. long and carrying on its end the shriveled body of the female." All of these characters I find correct in the specimens under consideration except the projection from the twig in a curve. Specifically there is also some difference from *japonica* as described by Prof. Cockerell, but not enough, I think, from what little study I have been able to give the specimens, to justify creation of a new species. There is for instance no indication of a double jointed tarsus. Joint 3 of the antennae is but slightly longer than 4, so that the formula is altered somewhat. Outer angle of anal plates is rather sharp and not rounded.

T. japonica is recorded from Japan on mulberry. Pepper is therefore a new food plant. It is also a new record for the Territory. But in the last respect there are several more to come.

(1). Bull. 4, Tech. Ser., Div. Ent., U. S. D. A., p. 47, 1896.

Proc. Haw. Ent. Soc., II, No. 2, Sept., 1909.

MARCH 4th, 1909.

The forty-ninth regular meeting was held in the usual place.

NOTES AND EXHIBITIONS.

Mr. Fullaway exhibited specimens of a new Coccid species, *Ceroputo ambigua*, found on the salt marsh grass, *Salicornia ambigua*, in the salt marsh regions of California, and offered some notes on its life-history. The species is small (about 3 mm.) and covered with a white waxy secretion. There are three larval stages before the mature female appears. The mature males, which are wingless, develop through the so-called pupal stage from individuals having the characteristics of the second larvae. There is one generation annually. The species, although exceedingly abundant in spite of predaceous and parasitic enemies, is without economic importance, the salt marsh grass—its only known host plant—not being fit for consumption.

Mr. Kirkaldy exhibited a new Mirideous Heteropteron from Borneo, and two boxes of Homoptera & Cimicidae (Pentatomidae) from New Zealand.

Mr. Swezey exhibited specimens illustrating his paper on "Another Banana Leaf-roller."

Mr. Kotinsky exhibited a huge scorpion (*Palamnaeus* sp.) a pair of which were brought alive from South Java by Mr. Terry and which he was obliged to kill in order to prevent their possible escape. The incident emphatically demonstrates the usefulness of an inspection service. Mr. Terry called attention to the absence in the Board of Agriculture laws or regulations preventing the importation of pests of this character.

Mr. Kotinsky told of a mealy bug that he had been collecting on the roots of Koa and other plants on Tantalus ever since 1905. From its apparent confinement to higher elevations, he was inclined to believe it to be endemic, especially since it was undoubtedly a new species to science. A few days ago, Mr. Fullaway brought specimens of a mealy bug collected on the roots of a pot-grown mango tree in the city in which he recognized his interesting Tantalus Coccid. Closer study with Mr. Fullaway showed it to be an undescribed *Ripersiella*. Shortly it is contemplated to publish a description jointly by Messrs. Fullaway and Kotinsky.

PAPER READ.

Another Banana Leaf-roller [Lep.].

BY OTTO H. SWEZEY.

Omiodes maia n. sp.

Male, female, 28-30mm.; head, thorax and abdomen dark fuscous much mixed with ferruginous scales, especially on the abdomen; apical margins of abdominal segments ochreous; antennae fuscous above, pale beneath, basal joint fuscous; palpi fuscous, whitish below with a slight ferruginous tinge anteriorly; femora and tibiae fuscous largely suffused with ferruginous; tarsi ochreous. Forewings dark fuscous suffused with ferruginous on costa, and less densely so near termen, a few ferruginous scales scattered in some other parts of wing; a whitish ochreous dash in middle near base; first line ochreous, angulated outwardly (nearly at right angles) at middle, upper portion indistinct, lower portion very distinct; roundish black orbicular; two blackish discal spots transversely placed (mostly contiguous) followed by a few ochreous scales; second line ochreous, sinuate outwardly beneath costa, below middle forming an acute triangular projection outwards; both lines often ferruginous mixed; veins marked with ochreous or ferruginous ochreous; cilia fuscous, darker at base. Hind wings medium fuscous, a darker discal spot and terminal dark fuscous line; a paler postmedian line with acute projection outwardly below middle, a few pale ferruginous scales in its dorsal part, a few also just before terminal dark fuscous line, which is usually interrupted by pale ferruginous scales on the veins; cilia as in fore wings.

Very similar to *O. musicola*, but the latter is paler fuscous. and has ochreous suffusions and markings where *maia* is ferruginous.

I bred a series of moths on three different occasions, from caterpillars found on bananas growing in two different gulches at the head of Manoa Valley: Jan. 23, March 10* and May 2*, 1909, respectively. In one of the gulches, I found the caterpillars quite numerous.

Full-grown caterpillars are just like those of *musicola*. Some have darker markings than others: markings of head quite black, and wider black margins to cervical shield, the longitudinal black bar joining it in front and behind, which gives the cervical shield a very blackish appearance. Caterpillars just hatched have heads entirely black; those one-third grown have most of the tubercles black.

Pupa similar to *musicola*.

* These observations were made after paper was presented to Society.

This makes four species of *Omiodes* now known to feed on banana: *blackburni* on all the islands, *meyricki* on Hawaii, *musicola* on Maui, *maia* on Oahu. They are closely related, all having similar pattern on wings and no doubt have evolved from a common ancestor. In a previous article I have mentioned differences in color and degree of angulation of first line of forewings. I have measured this angle in several specimens of each species with the following results: In *blackburni* it is 52° , in *meyricki* 56° , in *musicola* 85° , and in *maia* 80° .

APRIL 1st, 1909.

The fiftieth meeting of the Society was held in the usual place.

On account of his removal to accept a position in the Bureau of Entomology at Washington, D. C., Mr. D. L. Van Dine tendered his resignation as Vice-President. It was accepted, and Mr. F. W. Terry was elected to fill the office vacated.

NOTES AND EXHIBITIONS.

Mr. Terry presented notes on the Insects of Hong Kong and exhibited specimens.

PAPER READ.

A Conspectus of the Fulgoridae of the Hawaiian Hemiptera.

BY G. W. KIRKALDY.

The Fulgoridae are all apparently endemic, and belong to two genera, *Iolania* and *Oliarus*, both belonging to the tribe of Cixiini.

Three longitudinal keels on the mesonotum; costal margin of tegmina strongly granulate..... *Iolania*

Five longitudinal keels on the mesonotum; costal margin of tegmina not (or obscurely) granulate..... *Oliarus*

Iolania Kirkaldy.

1902, Faun. Haw., III, 118, Pl. 5, f. 3.

A reexamination of this genus presents only one species, *perkinsi*; the ground colour of the male tegmina is much yellower than in the other sex. I separate off, as a variety (*notata*), the form with a large brown blotch at the base of the tegmina of the male.

Oliarus Stal.

So far as concerns the structure of the legs, the Hawaiian forms all belong to the typical subgenus, but I separate them off under the name *Nesoliarus*, on account of the great plasticity of those characters which are of specific value in the exotic forms, and on account of the sexual dimorphism, which is more or less apparent—mostly considerably so—in the pattern and colouring of the tegmina. As it would not be possible to include these Hawaiian forms in a general table of species, owing to the above-mentioned plasticity, it is convenient to group them under a special subgeneric name (type *tamehameha*).

In the europæan fauna, the male genitalia have been extensively used in the differentiation of species. I have, however, not been able to do this with the Hawaiian species. The form of the parts is not very evident without dissection, and I have not had sufficient material except in a few species. Moreover, the form of the genital styles (the "claspers" of Scott), appears to be much the same in all, being not very dissimilar to those of *Cixius stigmaticus* when viewed from below (cf. Ent. Mo. Mag., VII, fig. I, p. 293), except that the stalks are straighter. With more material, I may be able in the future to investigate further.

The venation, which in the Australian and Fijian species I found so characteristic, is highly variable in the Hawaiian forms. The place of forking of the radial and brachial veins, and the place of union of the two claval veins, which characters seem to be of specific value in exotic forms, are inconstant and of no value here.

The tabular form under which I now proceed to describe the Hawaiian forms is, I think, sufficient for the present—till I can obtain more material in certain of them—to differentiate them apart from one another; at the same time, it is, in most cases probably, not sufficient to distinguish them from the species of other countries. As, however, the endemic forms here are not at all likely to occur elsewhere, this will be of little account.

The Hawaiian species are usually found among Ferns: *Sadleria*, *Cibotium*, *Gleichenia*, etc. Swezey (1) has described the nymphs of *O. kaonohi* (2), which he found in "decaying leaf-bases and fibrous matter of tree-fern trunks."

(1). 1907, P. Haw. E. S., I, 83.

(2). I identified this for Mr. Swezey as my *koanoa*, but the species seem to be different.

The following is a preliminary arrangement of the Hawaiian forms: (3).

- 1(2). Tegmina short and broad, costal margin thickened and arched at the base; apical and margin of wings fuliginous. LANAI; HAWAII, (Kona). F. H. 120 and 122, Pl. 4, f. 6...
.....4. *hevaheva* Kirkaldy.
- 2(1). Tegmina not specially thickened, nor arched at the base; more elongate, at least in the larger species.
- 3(8). Expanse of tegmina more than $17\frac{1}{2}$ mill.
- 4(5). Mesonotum brownish testaceous; tegmina immaculate (male), somewhat maculate (female); wings apically not fuliginous. KAUAI, F. H., 120, Pl. 4, f. 4.....
.....1. *tamehameha* Kirkaldy.
- 5(4). Mesonotum black; wings apically fuliginous.
- 6(7). Tegmina hyaline, immaculate (male), a narrow median transverse stripe, often faint, (female). OAHU, (Tantalus); MOLOKAI, 4000 ft., (a fragment); MAUI, (Haleakala); HAWAII, (Kilauea and Olaa). F. H., 120 and 121, Pl. 4, f. 5...
.....2. *kanakanus* Kirkaldy.
- 7(6). Clavus, inner 2-5 of corium, and apical $\frac{1}{3}$ of tegmina, suffused with fuliginous. Otherwise as' in *kanakanus*. MOLOKAI, (4000 ft.).....3. *kahavalu*, sp. nov.
- 8(3). Expanse of tegmina less than $17\frac{1}{2}$ mill.
- 9(36). Males.
- 10(29). Tegmina immaculate, except the veins.
- 11(14). Tegmina, with at least one-third suffused with fuliginous or yellowish-fuliginous.
- 12(13). Basal and apical thirds of the tegmina fuliginous, middle third hyaline. [Rarely the tegmina are partly hyaline apically, cf. F. H., Pl. 4, f. 8.] OAHU, (Koolau and Waianae ranges); MOLOKAI, (4000 ft.); HAWAII, (Olaa and Kohala Mountains).....5. *tarai* Kirkaldy.
- 13(12). Tegmina entirely dark fuliginous (sometimes a very little dilute). MOLOKAI, (4000 ft.); MAUI, (Haleakala, 5000 ft.). F. H., 123, Pl. 4, f. 9.....6. *moral* Kirkaldy.
- 14(11). Tegmina only dark (if at all) on veins, though sometimes partly tinged with yellowish.
- 15(18). Mesonotum pale castaneous; veins on basal two-thirds of tegmina pale.
- 16(17). Veins on basal $\frac{2}{3}$ minutely, but distinctly granulated with brown. Differs from *koanoa* by the longer and narrower tegmina and pale mesonotum. Length, 6 mill. OAHU, (Koolau ranges, all over); HAWAII, (Kilauea, on tree-ferns; ferns; and *Freycinetia*).....7. *kaonohi*, sp. nov.
- 17(16). Veins on basal $\frac{2}{3}$ not, or very obsolete, granulated; otherwise like *kaonohi*. HAWAII, (Naalehu, on fern, O. H. S.).....8. *fillicicola*, sp. nov.
- 18(15). Mesonotum black. [In some examples, the keels are dark castaneous].
- 19(24). Veins on basal $\frac{2}{3}$, black, or largely so.
- 20(23). Veins partly pale.
- 21(22). Tegmina shorter and broader. Length, 6 mill. OAHU, (Kona-huanui, O. H. S.).....9. *procellaris*, sp. nov.

(3). "F. H."=Fauna Hawaiiensis, III. The "length" is taken from apex of vertex to apex of closed tegmina.

- 22(21). Tegmina elongate. Length, $8\frac{1}{2}$ mill. KAUAI, (2000-3000 ft.).....10. *pluvialis*, sp. nov.
- 23(20). Veins black, or at least the median brachial, and apical ones). Length, 7 mill. KAUAI, (Halemanu, 4000 ft.).....
.....11. *nubigenus*, sp. nov.
- 24(19). Veins on basal $\frac{3}{4}$ pale, sometimes with dark granules.
- 25(28). Costal margins of tegmina more parallel.
- 26(27). Exterior keels of mesonotum subparallel with the interior pair. Length, 5 mill. OAHU, (Konahuanui, O. H. S.).....
.....12. *silvicola*, sp. nov.
- 27(26). Exterior keels of mesonotum straight, angulate basally. Length, 6-7 mill. HAWAII, (Kilauea and Olaa); MAUI, (Lahaina coast).....13. *montivagus*, sp. nov.
- 28(25). Costal margins of tegmina well rounded. Length, 7 mill. OAHU, (Kawailoa gulch); MOLOKAI, (4000-14500 ft.); HAWAII, (Hualalal, 5000 ft., Olaa, Kilauea). F. H., 120 and 124, Pl. 4, f. 11.....14. *koanoa* Kirkaldy.
- 29(10). Tegmina maculate.
- 30(33). Vertex truncate apically.
- 31(32). Mesonotal keels castaneous; tegmina scarcely more than twice longer than wide, hyaline, veins on basal $\frac{3}{4}$ pale, granules pale brown, tegmina sparingly spotted with pale brown. Length, 5 mill. OAHU, (Kaala, 3500 ft., on *Acacia koa*).....15. *acaciae*, sp. nov.
- 32(31). Mesonotal keels black. Tegminal veins almost entirely black! clavus with 3 black spots, rest of tegmen spotted with yellow fuliginous. Length, 9 mill. MAUI, (Haleakala, 5000 ft.).....16. *haleakalae*, sp. nov.
- 33(30). Vertex rounded or subangular apically.
- 34(35). Costal margins pale brown; tegminal veins particolored on basal half; tegmina scarcely more than twice as long as broad, on basal half; tegmina scarcely more than twice as long as broad. Length, 6 mill. MAUI, (Haleakala, 5000 ft.).....
.....17. *monticola*, sp. nov.
- 35(34). Tegmina about $2\frac{1}{2}$ times as long as broad; costal margins black and white alternately (also radial, etc.) Length 8 mill. OAHU, (Tantalus).....18. *kaohinani*, sp. nov.
- 36(9). Females.
- 37(42). Tegmina more or less fuliginous, or at least strongly yellowish; not speckled.
- 38(44). Mesonotum at least dark castaneous, generally blackish.
- 39(40). Tegmina dark fuliginous, except a small part of the costal area.....6. *mora* Kirkaldy.
- 41(38). Mesonotum pale castaneous; tegmina varying from yellowish to dark fuliginous.....
.....13. *montivagus*, sp. nov., and 7. *kaonohi*, sp. nov.*
- 42(37). Tegmina not fuliginous, or only spottedly so.
- 43(50). Tegmina immaculate.
- 44(47). Length not less than 7 mill.
- 45(46). Veins on basal $\frac{2}{3}$ of tegmina pale brown, granules dark. KAUAI, (4000 ft.).....19. *silvestris*, sp. nov.

* At Kilauea (of Hawaii) there is a similarly coloured form, $7\frac{1}{2}$ mill, long; vertex shorter and broader, of which I do not know the male. It may be called var. *volcanicola* nov. (of kaonohi).

- 46(45). Veins on basal $\frac{2}{3}$ alternately dark and pale; HAWAII, (Kilauea)*.....20. *pele*, sp. nov.
- 47(44). Length not more than 6 mill.
- 48(49). Cross veins on tegmina near the apex not suffused.....14. *koanoa* Kirkaldy.
- 49(48). Cross veins suffused. KAUAI, (2000-3000 ft. and Makaweli, 2000 ft.).....21. *kauaiensis*, sp. nov.
- 50(43). Tegmina maculate.
- 51(52). Length less than $6\frac{1}{2}$ mill. Vertex truncate apically, broad and short. HAWAII, (Kilauea), F. H., 120 and 122, Pl. 4, f. 7.22. *puna* Kirkaldy.
- 52(51). Length more than 7 mill.
- 53(56). Apical third of tegmina not spotted.
- 54(55). Tegminal veins particoloured. MOLOKAI, (4000 ft.); KAUAI, (Halemanu, 4000 ft.); HAWAII, (Kona, 4000 ft.).....20. *pele*, var?
- 55(54). Tegminal veins black.
- 56(53). Apical third of tegmina more or less spotted, or at least some of the apical veins strongly suffused.
- 57(58).
- (a). Face black, lateral margins narrowly castaneous, a pale wedge at the base of the clypeus laterally; vertex scarcely extending beyond the eyes, broad, lateral margins converging towards the apex which is slightly rounded; about twice as broad at base as at apex, and about $\frac{1}{4}$ longer than wide at base. Tegmina hyaline, heavily spotted, at least 4 black spots on the costal area; veins on the basal $\frac{2}{3}$ of tegmen particoloured. Sterna, abdomen, femora, etc., mostly dark piceous or blackish. Length, $10\frac{1}{2}$ mill. MOLOKAI....23. *paludicola*, sp. nov.
- (b). Face as in the last, but the pale area large vertex narrower, nearly twice as long as broad. Tegmina yellowish hyaline, veins black, except the radial which is partly white; apical third spotted. Underside, legs, etc., dull piceous. Length, $8\frac{1}{4}$ mill. HAWAII, (Hilo, 2000 ft.)...24. *nemoricola*, sp. nov.
- (c). Face as in the last: vertex short and broad, much as in *paludicola*. Tegmina hyaline, tinged with yellow, slightly spotted, veins particoloured. Legs brownish-yellow. KAUAI, (4000 ft.). F. H., 120 and 124, Pl. 4, f. 10.....25. *orcno* Kirkaldy.
 [var. *molokaiensis* has tegmina not yellowish more heavily spotted; face blackish. MOLOKAI.]
 [var. *oahuensis* is like *molokaiensis*, but the tegmina are obliquely banded, the pale area on the face larger than in the type. OAHU, Koolau range].
- (d). Vertex narrow, longer, slightly wider basally than apically. Tegmina not strongly spotted, sometimes scarcely so apically, with yellowish fuliginous transverse stripes (sometimes little apparent). Legs yellowish.....8. *kaohinani*, sp. nov.

* Perhaps also from OAHU, (Waianae, 3000 ft.) MAUI, (Kipahulu, O. H. S., and Haleakala, 5000 ft.).

I have to thank Mr. W. M. Giffard for the generous gift of his collections, and Messrs. O. H. Swezey and F. W. Terry for allowing me the loan of their specimens for examination. The foundation of this paper has been the balance of the collections made by Dr. Perkins for the "Sandwich Islands Committee."

The following new forms have been described in this paper:

Iolania perkinsi var. *notata*.

Oliarus kahavalu, *kaonohi*, *filicicola*, *procellaris*, *pluvialis*, *nubigenus*, *silvicola*, *montivagus*, *acaciae*, *haleakalae*, *monticola*, *kaohinani*, *silvestris*, *pele*, *kauiensis*, *paludicola*, *nemoricola*, spp., and *kaonohi* var. *volcanicola*; and *orono* var. *molokaiensis* and *oahuensis*.

On a new Derbid Homopteron from New Zealand and Notes on other Hemiptera.

BY G. W. KIRKALDY.

The genus *Cenchrea* was described by Westwood, as a subgenus of *Derbe* (1841 Ann. Mag. Hist., vi, 479; and 1842 T. Linn. Soc., London, xix, 15), with a single species, *dorsalis*, from St. Vincent in the Lesser Antilles. Since then, Uhler has described *exquisita* from the same Island (1895, P. Z. S., London), and Ball has added *uhleri* and *heidemanni* from the United States (1902, Can. Ent., 261).

As the only genus of Derbidae that was known to inhabit both New and Old Worlds, is *Lamenia* Stål (which has 9 species in America, one in Tahiti—a possibly wrong habitat however—2 in Queensland, and one in Larat of the Malay Archipelago), I was surprised to find among some Maorian Hemiptera sent me by my friends Mr. A. Hamilton (Director of the Dominion Museum) and Mr. G. Howes (Govt. Entomologist), from Wellington, two examples of a species of this genus. It must be noted, however, that it is very probably not endemic there.

In his figure of *C. dorsalis*, (1842 Trans cit., Pl. 19, f. 8), Westwood has evidently incorrectly represented the pronotum, which he has shown as having a truncate basal margin; a character found in no Derbid, in which family it is always emarginate, very often deeply so.

C. maorica, sp. nov.

The type example is pale yellowish-brown, the frons having a large inverted fuscous Y, the clypeus also partly suffused with the same tint. The tegmina are bronzy yellow, the costal area and the greater

part of the apical third blackish, the latter so suffused as to make apparent 3 bronzy-yellowish spots, one at each corner of the rough triangle. The veins are partly (and probably very varyingly) orange-brown, and there are several small yellow spots scattered over the tegmen. Wings fuliginous. Legs pale yellow. Abdomen black, the incisures sanguineous. The scutellum has 3 paler longitudinal lines. The other specimen is probably not quite mature, the whole colouring being pale, the small spots on the tegmina whitish, and the veins concolorous with the ground colour.

The tegminal venation is very similar to that of *C. dorsalis*, but the brachial vein is forked much nearer to the base.

Length, 4 mill.; expanse of tegmina, 15 mill.

Hab. New Zealand, Wellington (Hamilton and Howes).

I have recently received from Mr. Hamilton, a specimen of the Homopteron *Siphanta acuta* from Auckland. This is, I believe, the first record of its occurrence in New Zealand. It is of course, not endemic, but immigrant (probably introduced with ornamental shrubs) from Australia.

In my recent "List of the Hemiptera of the Maorian Region" (1909, Trans. N. Z., Inst., xii, 22-9), I omitted *Poecilometis gravis* (Fabricius), a Halyine Cimicid. This was described in 1781 from New Zealand, but has since been found in New South Wales. As this genus of 12 species is entirely Australian, and *gravis* has never been found since in New Zealand, it is probable that the latter habitat was incorrect in the first place.

In the same list, "syn." between 14 and 15 should be deleted; there should be a "h" before the second "*enicocephalus*" on line 29 of p. 26; and on p. 28, line 9 from bottom, "specimens" should be "species."

MAY 6th, 1909.

The 51st regular meeting of the Society was held in the usual place.

Mr. Giffard exhibited specimens of a stylops (*Elenchus* sp.), and leaf-hoppers (*Nesosydne ipomoeicola* Kirk.) from which they had bred. The leaf-hoppers were collected by him on Tantalus, and the stylops bred out in Jan. and Feb., 1906.

Mr. Giffard also wished to record the finding recently of *Orthezia insignis* infesting a *Clermontia* bush on Schmidt's Ridge, Tantalus.

JUNE 3rd, 1909.

The fifty-second regular meeting was held in the usual place.

PAPERS READ.

Notes on the Hemipterous genus *Oechalia*.

RY G. W. KIRKALDY.

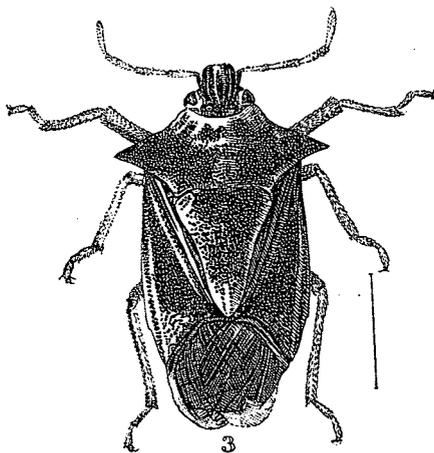
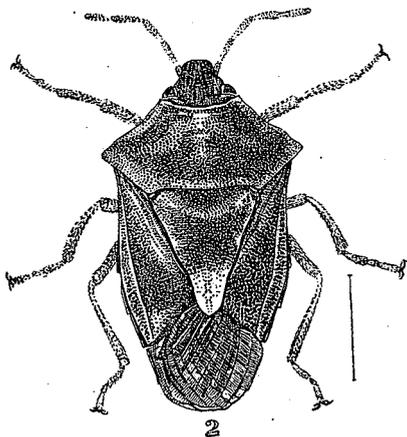
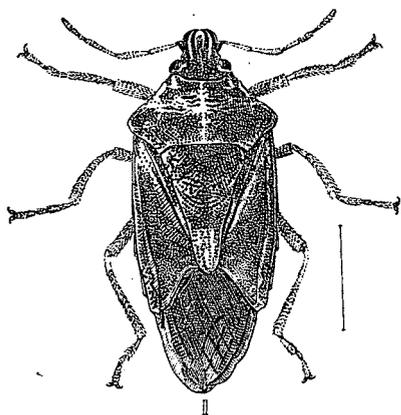
The genus *Oechalia* is a typical Cimicine, restricted to Australia, New Zealand and the Hawaiian Islands. It may be divided into two subgenera, the typical, containing only *O. consocialis*, from Australia and New Zealand, and *Hawaiicola* (nov.) with *grisea* (the type) and *kaonohi*, sp. nov., confined to these islands, the prosternum (1) in these two last having a little lobe on each side in front.

The australo-maorian *consocialis* is, like the hawaiian *grisea*, exceedingly variable in colour; in all the few specimens that I have seen, the pronotal angles are acute and prominent, perhaps a little more so than in any *grisea*. The male pygophor is very similar to that of the other species, but I have only one male which is perhaps not quite mature.

O. consocialis is carnivorous. Bergroth cites a correspondent as authority that it "se nourrit des cadavres de divers animaux" (1891, Rev. Ent., x, 202). Froggatt states that it feeds on larvae of the Lepidopteron *Phalaenides* (*Agarista*) *glycine*, which it finds on Vines, etc., and of the Coleopteron *Galerucella semipululata* which defoliates garden Fig-trees, ornamental trees, etc. "On a warm summer day, where the caterpillars are plentiful on the Vines, these bugs may be observed running about with the remains of a caterpillar hanging on their beak, or else quietly at work sucking up the juice of a freshly attacked victim" (1902, Agr. Gaz., N. S. Wales, 321). This carnivorous habit is well known in the Cimicinae, and I have only recently received some nymphs of the closely allied New Zealand species *Cermatulus nasalis* with caterpillars of *Asaphodes megaspilata* (on *Leptospermum scoparium*), attached to their beaks, from my friend Mr. George Howes of Wellington.

O. consocialis (also known as *schellebergii*) is apparently well distributed over Australia and Tasmania, as well as New Zealand. The record from the Philippines is probably erroneous.

(1) Schouteden, (1907), Gen. Ins., LII, 75, incorrectly says "pronotum."



Kirkaldy—On the genus *Oechalia*.

1. *O. kaonohi*.

2. *O. grisea*.

3. *O. grisea* var. *pacifica*.

The subgenus *Hawaiiicola* now contains at least two species; whether the new one now described is the "new species" of my paper of the Proc. Haw. E. S., I, 141, I do not know. As yet, I have seen only a single male taken at Naalehu, Hawaii, by Mr. Swezey, in a sugar-cane field.

Stal's two species, *Arma patruelis* and *pacifica* evidently refer to the two forms of *O. grisea*, *pacifica* being the same as typical *grisea*.

The following table will distinguish these three species:

- 1(2). Prosternum simple; abdominal basal spine of the urosternites rather short, scarcely extending beyond the hind coxae; male pygophor pale, with pale styles.....[*Oechalia* typical] *consocialis* Boisduval.
- 2(1). Prosternum lobulate in front on each side; urosternal spine reaching well beyond the middle coxae or nearly to the fore coxae.....[subg. *Hawaiiicola*, nov.]
- 3(4). Broader form, pronotum very distinctly transverse; urosternal spine shorter. Male styles blackish; posterolateral spinelet on 7th urosternite more distinct. 2. *grisea* Burmeister.
- (a). Pronotal spines blunt=*grisea* typical.
- (b). Pronotal acute, prominent=*var. patruelis*.
- 4(3). Longer and narrower form, pronotum scarcely transverse, urosternal spine longer, male styles pale; posterolateral spinelet on 7th urosternite scarcely distinct. 3. *kaonohi*, sp. nov.

Oechalia kaonohi, sp. nov.

Male very similar to *grisea*, but as may be seen from the dimensions, much longer and at the same time narrower. Both head and anterior part of pronotum are distinctly less declivous and the head is distinctly longer. In typical *grisea* the proportion of the length of the pronotum to its width is 2:1, while in *kaonohi* it is $2\frac{2}{3}$:1.

The pronotal angles are roundedly obtuse and scarcely prominent. As stated in the table, the abdominal spine is distinctly shorter and the 7th urosternite is scarcely spinose laterally. The male pygophor is pale and the papillae on the semicircular plate are less in number, while the crenulations on the ventral margin of the same are less in number and feebler. The colouring is similar to that of light-coloured *grisea*, and the new species will be found, probably, to vary like the latter.

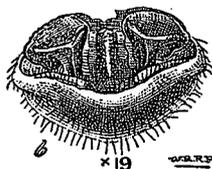
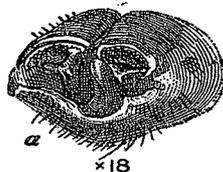
Length, 12 mill., breadth between lateral angles of pronotum, $4\frac{1}{2}$ mill.

Hab. Hawaii, Naalehu, and other places.

In no way is typical *grisea* a link between its var. *patruelis* and *kaonohi*, as apart from the development of the pronotal spines, the first two are identical in form.

- (a) *Oechalia grisea*, male
pygophor;
(b) *O. kaonohi*, the same.

N. B.—In both, the ventral surface of the pygophor is uppermost.



I have not seen any females of *kaonohi*, but that of *grisea* is sufficiently distinct from *consocialis*, its 7th urosternite being more deeply emarginate apically, and the apicolateral plate of the pygophor is distinctly longer and more prominent.

Note on the Synonymy of two Hawaiian Beetles.

BY G. W. KIRKALDY.

In Mr. Champion's notice in the Ent. Mo. Mag (2), xx, 103-4, (May, 1909), "Notes on Cossonidae," it is stated that the beetle *Thalattodora insignis* Perkins (1900) found in a log on the beach at Kauai [Kanai! Champion] is a synonym of *Dryotribus mimeticus* Horn, 1873, from South Florida. This beetle is also recorded from N. W. Australia; "Nyew-tew" Isl., China; by Champion (Ent. Mo. Mag., (2), xx, 123, June, 1909). The Australian examples "were found under driftwood on a sandy beach." In the latter paper, Champion also synonymizes *Haloxenus Perkins*, (1900), from Molokai and Lanai, with the Floridan *Macrancylus* Leconte (1876).

Notes on *Hypocala andremona* and *Hypocala velans* [Lep.].

BY OTTO H. SWEZEY.

[Specimens exhibited].

As reported on page 6, Vol. II of the Proceedings of the Hawaiian Entomological Society, Mr. G. P. Wilder discovered the caterpillars of *Hypocala andremona* on a tree in his yard. At the time the tree was supposed to be a Sapota, but it could not be determined with certainty as the tree had never borne fruit. Recently Mr. Wilder has informed me that this tree has borne fruit, and it proves to be Sapota.

On a trip up Niu ridge by several of the members of our Society, May 16, 1909, caterpillars of this same species of moth were discovered feeding quite numerously on Hawaiian ebony trees (*Maba sandwicensis*). They showed the same variation in coloration as those which infested Mr. Wilder's Sapota tree. Among them were a few that were slightly different and not so slender as the others, these on rearing proved to be *H. velans*.

May 31, on a trip into the Koolau Range above Wahiawa, I again found caterpillars of *H. velans* feeding on an ebony tree. The caterpillars of this moth were heretofore unknown; now its native food plant is made known as well as that of *H. andremona*.

I now present descriptions of larva and pupa of each.

Hypocala andremona Cramer.

Full-grown larva is about 45 mm.; cylindrical, slightly narrowed in front of 5th segment.

Green form—Nearly uniform bright green with a yellowish tinge, more yellowish on dorsum of 5th segment. A pale yellow subdorsal line and a pale yellow line just below spiracles; three crinkled faint lines between these two, a similar line on each side of dorsal vessel; spiracles white, black margined, a black spot above and enclosing the upper part of each, often a forward projection from the upper part of the spot, more particularly on the spot above the posterior spiracle. Tubercles concolorous, inconspicuous; hairs slender; 12th segment slightly enlarged dorsally. Head concolorous, with two vertical black bars in front very wide apart. The black spots on the spiracles are larger in different specimens, varying till in some there is a continuous stripe enclosing the spiracles, pinkish on the lower part. The caterpillar turns rosy dorsally when about ready to pupate.

An intermediate form has head mostly black, and much blackish mottling on dorsal part; cervical shield mostly black-marked; the black spiracular stripe incomplete.

Another intermediate form has a complete subdorsal black stripe, spiracular stripe incomplete, several fine much-interrupted black lines between these two stripes; an interrupted subspiracular black stripe; a few short black lines on dorsum of segments 2 to 6; conspicuous yellowish-white transverse dorsal mark on segment 5; head blackish on periphery, or nearly all blackish.

Black form—Almost entirely black, less intense below; head entirely black; a white line each side of dorsal vessel, a subdorsal white line and a fainter line between it and the preceding; several crinkled white lines on sides; more or less whitish or pinkish between segments on line of spiracles, large white patch below spiracle making an interrupted white subspiracular stripe; spiracles white; two subdorsal white spots on segment 5, often pinkish; segment 12 slightly enlarged dorsally and some whitish or pinkish on this enlargement. Two specimens had orange-yellow on middle of cervical shield, on 5th segment and on hump of 12th segment.

Pupa—22 mm.; medium dark brown; wing- antenna- and leg-cases terminate roundly on apex of 4th abdominal segment; incisures between segments 4-7 movable; fine punctures scattered over surface of abdomen above and below, more numerous at base of segments; spiracles situated in smooth oval darker areas; cremaster inconspicuous, with four slightly diverging, ventrally curved, hooked spines, the two inner ones larger.

Pupation takes place in a cell in the soil, or beneath trash on the surface. The cell is supplied with a few fibers of silk. The pupal period 13-17 days.

Hypocala velans Walker.

Full-grown caterpillar—40 mm.; shorter and thicker than *andremona*; of a fuscous-brown color which is nearly uniform, but on close examination is found to be made up of dark fuscous or black with numerous crinkled longitudinal lines of a lavender color; two distinct lines border the dorsal vessel and have outward angulations in the segments; just at inner margin of tubercle i in segments 5-11 is a small black spot, a larger spot in front of tubercle ii in segments 7-10; a spot of yellow and lavender mixed lies outwards from tubercle i in segments 5 and 12; a pale yellowish spiracular line; tubercles pale lavender with a black dot at base of setae; spiracles oval, very pale yellowish with black margin; cervical shield has a black longitudinal subdorsal band on each side; head mostly black, a few pale lavender spots in front and on upper part, paraclypeus pale, with two black spots.

Two specimens were light green with the lines which were lavender in the other specimens white instead; spiracular stripe

with upper half black and lavender mixed, lower half white; one has black tubercles, in the other they are concolorous. Head green with black vertical band in middle of each lobe; one has almost whole side of head black.

Pupa—23-25 mm.; similar to *H. andremona*, except that it has the cremaster slightly produced (spines the same) and there is a black dorsal protuberance on posterior margin of mesothorax; the metathorax is longitudinally striate, whereas in *andremona* it is smooth. Pupa formed in cell in the soil.

Meyrick in "Macrolepidoptera" of the "Fauna Hawaiiensis" considers *velans* to be a native race of *andremona*, which is an American species, and that the typical specimens caught by Dr. Perkins were recent immigrants. Be that as it may, the differences shown above for the larvae and pupae taken in connection with the differences in the adults, seems to me to be sufficient to consider them as distinct species; i. e., if *velans* is derived from *andremona*, it has become sufficiently modified as to be considered a species.

Note on *Plagithmysus perkinsi* Sharp [Col.].

BY W. M. GIFFARD.

(Presented by O. H. Swezey).

I have just been fortunate enough to breed this beetle from a larva I brought back with me from the neighborhood of the Volcano House, Kilauea, Hawaii, June 6, 1908. On that date, I took a finely matured specimen on a "naieo" tree (*Myoporum sandwicense*) and noticing signs of decay on the tree, as well as traces of the larva of this insect, I cut a section of the trunk and brought the same with me to Honolulu. Ever since that time, I have been watching and following up the boring of the larva beneath the bark, having on two occasions come onto the larva, fortunately however, not damaging it.

For the period between June 6, 1908, and the emergence of the imago, I have had the section of wood enclosed in a sack at my Tantalus home. The sack and all have been dipped twice per week in pure rain water, and besides the wood has been exposed to sunshine at various intervals. The imago emerged May 25, 1909. The larva had bored about 8 inches in a zigzag manner, during the 11 months I had it in my possession.

Plagithmysus perkinsi is one of the rarer species and difficult at present to obtain unless under the most favorable circumstances. So far as I know, it has not before been bred from the larva.

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