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OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

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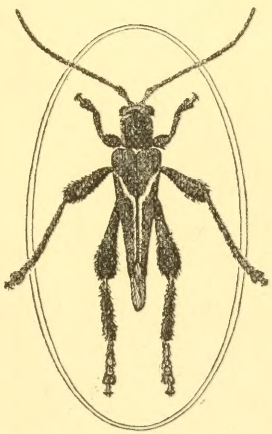

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ERRATA

Page 173, line 22, for *was* read *were*.
,, 175, ,, 15, for *madianly* read *medianly*.
,, 187, *No. 3* should be *No. 4*, and *No. 4* should be *No.* 3. *Coleotichns* belongs to the *Cimicidae*
,, 188, No. 7 is unknown to me as an Hawaiian insect (G.W.K.)
,, 189, No. 14, delete † and insert *.
,, 203, No. 144, for *ipomaeicola* read *ipomoeicola*.
,, 205, No. 160, for *Peregrimus* read *Peregrinus*.
,, 208, Fig. 1, for *Nseosydne* read *Nesosydne*.

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VOLUME NUMBER ONE

1905-1907

HONOLULU, T. H.

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ERRATA IN VOLUME I

Page 30, line 13, for *"towoombae"* read *"toowoombae."*
" 45, line 8, for *"sandwichensis"* read *"sandwicensis."*
" 45, line 9, for *"Metrosiderus"* read *"Metrosideros"*.
" 48, line 17, for *"Freycinctia"* read *"Freycinetia"*.
" 95, lines 11-12, for *"Bembidiodes"* read *"Bembidioides"*.
" 96, line 3, for *"Labetes"* read *Labetis"*.
" 97, line 24, for *"nigri"* read *"nigra"*.
" 113, line 16, for "bee" read "wasp".
" 125, line 15, for *"prestiosa"* read *"pretiosa"*.
" 173, line 22, for "was" read "were".
" 175, line 15, for "madianly" read "medianly".
" 187, line 22, "No. 3" should be "No. 4", and "No. 4" should be "No. 3". *Coleotichus* belongs to the Cimicidae.
" 188, line 2, add "This species is unknown to me as an Hawaiian insect".
" 189, line 33, delete the † and insert *.
" 203, line 13, for *"ipomaeicola"* read *"ipomoeicola"*.
" 205, line 15, for "Peregrimus" read "Peregrinus".
" 207, line 7, for *"insulicola"* read *"silvicola."*
" 208, line 7, for *"Nseosydne"* read *"Nesosydne"*.

2.15.10

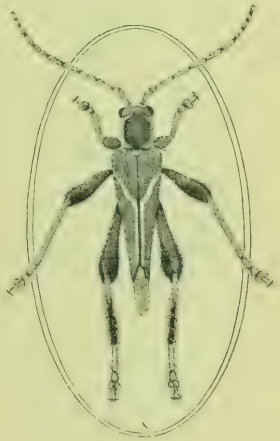
PROCEEDINGS

OF THE

Hawaiian Entomological Society

I

(FOR THE YEAR 1905)



HONOLULU, APRIL 3, 1906

PRICE 50c.

Hawaiian Institution

PROCEEDINGS

OF THE

Hawaiian Entomological Society

I

(FOR THE YEAR 1905)

HONOLULU, APRIL 3, 1906

PRICE 50c.

ANNOUNCEMENTS

Meetings are held the first Thursday of each month at 7:30 p. m. in the Board Room of the Bureau of Agriculture & Forestry, corner of South King and Keeaumoku Streets, Honolulu.

* * * *

Members exhibiting specimens at meetings of the Society are requested to hand to the Secretary, *at the meeting*, a note in writing of the generic and specific names of all specimens exhibited together with localities, and any remarks thereon which the exhibitors wish published. In the absence of such notes in writing, the Secretary and Editors will not be responsible for the accuracy of the report of such exhibition or for entire omission of any reference thereto in the Proceedings.

* * * *

The design on the cover represents an undescribed species of the autochthonous genus *Callithmysus*, and has been kindly drawn by Mr. W. E. Chambers, one of the members.

* * * *

The thanks of the Society are due to the Commissioners of Agriculture & Forestry for permitting their Board Room to be used for its meetings.

* * * *

The Society, having no separate Library, does not exchange its publications.

* * * *

All correspondence to be addressed to the Secretary-Treasurer, at the Bureau of Agriculture & Forestry, from whom copies of the Proceedings may be purchased.

Hawaiian Entomological Society

Founded 1905

LIST OF OFFICERS FOR 1905

President	R. C. L. Perkins
Vice President	Alexander Craw
Secretary-Treasurer	Jacob Kotinsky
Members of Executive Committee	Otto H. Swezey D. L. Van Dine

Editors of the Proceedings, G. W. Kirkaldy and Otto H. Swezey

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Membership 1905

† HONORARY * ORIGINAL MEMBER

	*Austin, C. J.		†Newell, Bro. Matthias
	*Bryan, W. A.		*Perkins, R. C. L.
March 9	Cobb, Dr. N. A.	March 9	Peterson, Miss M.
	*Craw, A.		*Swezey, O. H.
	*Eckart, C. F.		*Swezey, Mrs. O. H.
	*Giffard, W. M.		*Terry, F. W.
	*Hosmer, R. S.		*Van Dine, D. L.
	*Kirkaldy, G. W.	May 11	Weinrich, Jr., W.
†	*Koebele, A.	July 10	Weinrich, Jr., Mrs. W.
	*Kotinsky, J.	March 9	Wilder, G. P.

PROCEEDINGS

OF THE

Hawaiian Entomological Society

DECEMBER 15th, 1904.

A meeting, to consider the advisability of forming a Hawaiian Entomological Society, was held in the Board Room of the Bureau of Agriculture and Forestry, at 7:55 p. m.

After the meeting was called to order by Mr. Kotinsky, Mr. Kirkaldy and Mr. Kotinsky were elected temporary chairman and secretary, respectively; others present were Messrs. Austin, Craw, Hosmer, Terry and Mr. and Mrs. Swezey.

The organization of the proposed Society was discussed fully by all present, and a Constitution Committee was appointed, consisting of Messrs. Craw, Kotinsky and Terry, to report at the next meeting.

JANUARY 26th, 1905.

The first regular meeting was held in the Board Room of the Bureau of Agriculture and Forestry.

The following Constitution was adopted, Mr. Perkins being temporarily in the chair.

CONSTITUTION.

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.—MEMBERS.

The Society shall consist of active, corresponding, and honorary members. No corresponding members shall be elected from residents on the Island of Oahu. The names of candidates for membership shall be brought before the Society at a regular meeting by either an active member or the secretary, to whom application may be made. These candidates shall be balloted for at the next regular meeting of the Society. A majority vote of the active members present when the ballot is taken shall be necessary for election.

ARTICLE IV.—OFFICERS.

The officers of the Society shall be a President, Vice-President, and Secretary-Treasurer, to be elected by ballot at the annual meeting, except the Vice-President, who shall be appointed by the President at the same meeting. There shall be an Executive Committee, consisting of the officers of the Society and two members to be elected by the Society.

ARTICLE V.—DUTIES OF OFFICERS.

SECTION 1. The President, or, in his absence, the Vice-President, shall preside at the meetings of the Society and of the Executive Committee. It shall be the duty of the President to deliver an address at the closing meeting of the year.

SECTION 2. The duties of the Vice-President shall be to perform all duties of the President in the absence of the latter.

SECTION 3. The Secretary-Treasurer shall take and preserve correct minutes of the proceedings of the Society, preserve all publications and other property belonging to the Society, conduct all official correspondence of the Society, keep a list of all members together with their addresses, solicit papers and notes for the meetings, give due notice, in writing, of all meetings at least three days in advance; shall have charge of all the moneys of the Society, and shall make disbursements only under direction of the Executive Committee; he shall collect all fees and assessments, and notify all members who are in arrears, and submit a report of the finances of the Society at the annual meeting or whenever called for.

SECTION 4. The affairs of the Society shall be conducted

by the Executive Committee, whose duty it shall be to have direction of the finances, audit the accounts of the Secretary-Treasurer, provide for publication, and transact any other necessary business.

ARTICLE VI.—MEETINGS.

Five (5) members shall constitute a quorum. The regular meetings are to open 7:30 p. m., and shall be held, unless otherwise ordered, on the first Thursday of each month. The annual meeting for the election of officers shall be the regular meeting for the month of January. The nominations for officers shall be accepted at the preceding meeting. Special meetings may be called by the Executive Committee.

ARTICLE VII.—FEES.

The annual fee for active members shall be five dollars ($5.00), payable upon election and at each annual meeting thereafter, unless such election take place after the last day of September, when no fees are to be collected for that year. No fees are to be collected from corresponding members, or ladies who are active members. Any member in arrears for one year may, after due notification, be dropped from the rolls. No member in arrears shall be entitled to vote.

ARTICLE VIII.—AMENDMENTS.

The Constitution of the Society may be amended at any regular meeting by a two-thirds vote of the active members present, specific notice of such amendment having been given in writing to all active members at least one month previously.

ARTICLE IX.—ORDER OF BUSINESS.

The order of business of the regular meetings, unless otherwise ordered by the Executive Committee, shall be as follows:

1.—Reading and Approval of Minutes of Last Meeting.
2.—Reports of Officers and Committees.
3.—Election of Members.
4.—Miscellaneous Business.
5.—Reading of Papers and Discussions.
6.—Notes and Exhibitions of Specimens.
7.—Motion to Adjourn.

The following officers of the HAWAIIAN ENTOMOLOGICAL SOCIETY were elected for 1905:

President, R. C. L. PERKINS.

Secretary-Treasurer, JACOB KOTINSKY.

Members of Executive Committee, OTTO H. SWEZEY and D. L. VAN DINE.

The President appointed MR. ALEXANDER CRAW as *Vice-President.*

Upon motion of Mr. Van Dine, seconded by Mr. Craw, Mr. Albert Koebele was unanimously elected an Honorary Member of the Society.

FEBRUARY 9th, 1905.

The second regular meeting of the Society was held in the Board Room of the Bureau of Agriculture and Forestry, Mr. Perkins in the chair.

Honorary Member—Brother Matthias Newell of Hilo was unanimously elected an Honorary Member.

PAPERS.

Mr. KOTINSKY read a part of his *"History of Economic Entomology in Hawaii,"* the whole of which will be published elsewhere. In the course of the subsequent discussion, Mr. Perkins stated that *Sphenophorus obscurus* was known upon these islands about 1865, and was injurious at about that period. This did not necessarily imply that it was brought here then, because since it occurs in papaias, cocoanuts and royal palms, besides sugar cane, it might have been introduced with some of the plants brought here many years previously. He also stated that *Coccinella abdominalis* was affected by the Braconid parasite *Centistes americana* Riley, which is so destructive to *Coccinella repanda,* before the latter was brought by Koebele to the Islands.

Mr. R. C. L. PERKINS submitted "*Entomological and Other Notes on a Trip to Australia,*" and subsequently presented the following summary for publication:

"Sydney was reached by Koebele and myself in May, and found cold. An orange orchard in Parramatta was scoured for ladybirds, and the first consignment was sent from those collected there. There was no sugar cane, but there were many leaf-hoppers

upon the grass and these were observed by Mr. Koebele to be parasitized by Hymenoptera. No one in Australia seems to have ever studied the parasites of Fulgoridae to any extent. After leaving Sydney, the next ten days were spent at Brisbane and in the Botanical Gardens the first cane was observed and a few hoppers noticed upon it. Here, also, were found the dipterous parasites of leaf-hoppers; some of these parasites, the maggot of which lives within the body of the hopper, might have proved useful here, but the work of collecting and introducing them successfully would have taken months of exclusive labor and then might have failed. It was cold and even frosty there.

"Bundaberg was the next stop; it was very warm at midday and very cold at night, the latter so much so that the cane was turned yellow. Leaf-hoppers were found in the cane fields and Mr. Koebele verified his prediction by breeding some two or three species of hopper-egg parasites from eggs collected there. In our anxiety to get north we stopped but ten days.

"One day was spent at Townsville; this place was found very dry and bare; no green grass, no cane. The most noticeable thing was a row of fig-trees, the leaves black with fungus, on which Siphantas had previously swarmed. These, however, had been badly parasitized and numerous cocoons of the parasite plastered the leaves.

"At Cairns, systematic work on cane- and other leaf-hoppers was begun; the cane was found to be inhabited by half a dozen of these, all about equally numerous, and none injurious. Most conspicuous in the cane was a blue lady-bird collected by Koebele years ago, and determined by Blackburn as *Orcus ovalis*. It feeds on the rust of cane and grasses, whereas the very similar *O. chalybeus* is distinctly a tree species, and has the usual carnivorous habits. Specimens of a very fine blue lady-bird were found feeding on Diaspines on *Pandanus;* seemingly a valuable species to introduce, they died out in course of transit. Both the Coccinellid and Scale are comparatively rare. A black lady-bird of about the same size and shape was also observed, while a small patch of forest close to a cane field was examined and some good lady-birds were found there. An ant (*Pheidole*), which is our common species in Hawaii, swarmed everywhere, and no lady-bird or its larva could get at the scales on many badly affected trees.

"On the whole, entomologically, Cairns was disappointing in July and August, the two months we spent there. Local entomologists considered collecting hardly worth while at this season. Birds were interesting and varied and in fine plumage and it was a great pleasure to see such a number of forms new to me. Economically the crow is very important in some cane districts. It is very tame, following the plough and eating the grubs of the injurious chafers as they are turned up. Having gorged to repletion, it will take a rest and then recommence feeding. These chafer grubs are, as is well known, destroyed by the larva of a parasitic Fossorial wasp, *Diclis*. In some places a small *Rhipidura* was seen catching insects in the cane-fields; it is extremely like our Hawaiian fly-catcher (*Chasiempis*) but ours will never leave the forest for the cane-lands. Another Australian species is commonly seen catching flies off the backs of cattle. It would be most valuable in these islands. The tropical birds are wantonly slaughtered around Cairns, by boys and men, who are always to be seen on a Sunday, killing anything that comes their way.

"Most of the time at Cairns was spent in studying leaf-hoppers on graminaceous plants. The cane-hopper was found breeding on cane only, never on grasses. Tryon, the State entomologist, who knows the Queensland insects of economic importance better than any one, says the corn-hopper (*Peregrinus maidis*) is a native of Queensland, being found on native grasses. This is very doubtful, as in other countries it will attack native grasses and foreign alike. The fact that it does much damage and that we found no specific natural enemy points otherwise. One man at Cairns told me he lost five crops of corn in succession from this hopper.

"At the end of August we returned to Townsville. There had been no rain and the place was disgusting. Rockhampton was hot, the temperature over 100° F., but the gardens were very pretty with such masses of flowers, as we had not seen elsewhere.

"When we left Cairns, forest fires were general throughout Queensland and the destruction of animal life must have been enormous, in addition to the waste of fine timber. We worked in two very different kinds of forest in Australia—the one chiefly characterized by its many Eucalypti, and the other of a regular

tropical character. Both seem to be particularly hardy, and are ruthlessly and relentlessly destroyed by the people. They ring-bark and burn everything to provide a miserably poor pasture land. In some places acres and acres of valuable trees have been destroyed and the land allowed to become covered with injurious weeds, so that it is absolutely valueless from any point of view, yielding neither timber nor forage. Many of the Australian woods are very fine for building and other purposes; they are much more hardy and quick-growing than our Hawaiian trees, and many could be no doubt imported here with great advantage.

"The following is a very rough list of the leaf-hopper parasites that we observed. They have not yet been critically examined.

Chalcid and Proctotrupid parasites bred from leaf-hopper eggs		6 sp.
Dryinidae	parasitic on nymphs or mature hoppers	30 sp.
Chalcids	ditto	2 sp.
Diptera	"	20 sp.
Stylopidae	"	3 sp.
Lepidoptera	"	3 sp.

"Probably all these are new to science as species and many also as genera."

In reply to Mr. Craw, Mr. Perkins said that all cane insects from Queensland should be kept out. They have moth-borers, including a *Nonagria,* which is parasitized, however, by an *Encospilus.* There are at least twelve species of leaf-hoppers on their cane. The cane-hopper of Fiji is not the same as the one in Australia; it has a Stylopid parasite, which might be useful here. The Australian forests did not seem to suffer much from insect injury, when in their natural condition.

There are many fruit-flies of the genus *Dacus* in Australia. On the coast steamers the larvae and pupae were seen dropping from crates of bananas and tomatoes in dozens on the deck. They do much damage in Queensland, and the oranges are also badly infested.

Exhibitions.

Mr. Kotinsky exhibited specimens of the Elaterid, *Chalcolepidius erythroloma,* 44 specimens of which were collected in the course of a couple of months by Mr. Giffard on one Koa tree

in a row of about eight or nine lining the road to Tantalus. Mr. Perkins suggested that such a collection upon one tree is a common phenomenon in insect life when there is some attraction either in the form of food or odor.

Mr. Terry exhibited a living male and female of *Callineda testudinaria* which came here from Australia on December 13th. The female began to lay eggs on the 15th, and has since deposited 32 batches, comprising 897 eggs. She apparently is still capable of laying a good many more.

MARCH 9th, 1905.

The third regular meeting was held at the usual place, Mr. Craw, Vice-President, in the chair.

Members elected—Miss Melika Peterson, Dr. N. A. Cobb and Mr. Gerrit P. Wilder.

Papers.

Mr. Kotinsky read the whole of his paper on *"The History of Economic Entomology in Hawaii."* In the discussion that followed, Mr. Kirkaldy's objection to the statement that native vegetation has been driven to any large extent into the mountains by the introduced flora was met by Mr. Austin with the assertion that to his knowledge the native trees came down to water level in wet places. "Kou" (*Cordia subcordata* Lam.), for example, is occasionally found on low levels. Mr. Austin also believed that guava was introduced into the islands about 1830. Mr. Kirkaldy said that *Lycaena blackburni,* a questionably native butterfly, is occasionally found as low as Punchbowl, and Mr. Terry stated that *Vanessa tameamea* is also at times found in town.

Exhibitions and Notes.

Mr. Terry stated that the *Callineda testudinaria,* mentioned at the last meeting, had raised her egg-record to 944; altogether there were 35 batches, the first being laid on December 13th, the last on February 14th.

Mr. Terry also exhibited a representative collection of Hawaiian butterflies, ten species in all. *Pyrameis tameamea* is the native species and one other, *Lycaena blackburni,* doubtfully so; all the rest being introduced. This was supplemented by Mr. Kotinsky's

exhibition of an inflated larva and two live pupae of the native species.

Mr. Kirkaldy exhibited three old entomological works which he had recently purchased: there were Thomas Moufet's "Theatrum Insectorum," London, 1634; Swammerdam's "Historia Insectorum Generalis," 1693; and Frisch's "Beschreybung von allerley Insecten in Teutschland," 1720-38. Considering their age, every one present marvelled at the excellent state of preservation of the prints and cuts. Dr. Cobb stated upon the authority of an expert on paper that our modern half-tones, which are printed on paper so heavily chalked, will not last over fifty years.

Mr. Kotinsky exhibited dipterous larvae in a tube; into this tube were originally deposited whatever larvae or pupae seemed dead or dying selected from a lot sent by Mr. Koebele from Australia. The object of the selection was to breed up some parasite of these Diptera, but he was surprised to find some two or three days later that the tube swarmed with live dipterous larvae, although he had constantly kept the tube closed with a cotton plug. Mr. Terry suggested that some Sarcophagid might have surreptitiously inserted her ovipositor and dropped some eggs or larvae into the tube. Dr. Cobb stated that he had observed several dozen flies aboard ship all the way from San Francisco to Honolulu. Mr. Bryan stated that during a cruise on a sailing vessel lasting some two months, he had observed flies constantly upon it.

The question raised by Mr. Kotinsky regarding the seasons of these islands, as judged by the manifestations of life, elicited an extensive discussion, participated in by Messrs. Bryan, Terry, Kirkaldy, and Kotinsky. Mr. Bryan stated that, as a general rule, birds upon these islands nest most commonly about the end of February to the beginning of April, which leads him to believe that our month of March corresponds in a way to May or June in the temperate zones. It so happens that it rains very freely during the nesting season, and many nests with eggs of young are often drowned out. His belief is that it is not so much the rainy weather or the food supply that affects the season of nesting as such climatic conditions as temperature, etc. He had one nest of young of an owl (*Asio accipitrinus subsp. sandwicensis*), that is a sub-species very closely allied to the American type-form, which was secured in November. Another nest of owls was

brought to him in March; he has nests of the Hawaiian hawk which were secured in autumn. These facts lead Mr. Bryan to the belief that possibly, owing to the insecurity of nesting in March, they are adapting themselves by transferring the nesting season to autumn. However, the data are too meager as yet to allow of anything but speculative generalizations. Mr. Kotinsky based his belief on the present month corresponding to spring in the temperate zone on the following: The Koa tree (*Acacia koa*) is now everywhere in blossom. Out of six specimens of *Plagithmysus pulverulentus* (?) collected by Mr. Terry and himself, on Koa on Kalihi Heights on February 26th, three were in the act of oviposition. *Pyrameis tameamea,* a beautiful but infrequent sight during the winter months, was observed by Mr. Giffard and himself on Tantalus on March 5th in droves of 20 and more fluttering about certain spots on Koa trees. In general, there seems a revival of insect and vegetable life. Mr. Terry suggested that the nesting season of birds is gauged by the food supply. Mr. Craw stated that the San Jose scale (*Aspidiotus perniciosus*) as observed in California by Prof. Comstock and himself in 1880, had only produced one brood, but shortly after that all stages of the insect could be found upon the trees throughout the summer. Mr. Kotinsky said that in the opinion of many entomologists the San Jose scale having spread out to its farthest limits, north, south, east, and west of North America, seems now to have run its course, so to speak, and ceased to be the dread it once was. Neither could this degeneracy be attributed, in the Eastern states at least, to the activity of parasites. Mr. Bryan, concurring, referred to the instance of the Western grasshopper which has ceased to be a dread pest. Mr. Craw asserted his unshaken belief in parasites, and related the story of *Lecanium oleae* being subdued by *Scutellista cyanea;* he also stated that Mr. Boggy had recorded a grasshopper parasite which killed 90% of its host. Dr. Cobb remarked that the grasshopper fungus has been experimented with in New South Wales, but met with no greater success than elsewhere. The hopper-dozer is used effectively there.

Mr. Kirkaldy raised the question of grasshoppers as food; he had tried some but found them rather gritty. He had also some years ago sampled some dried *Arctocorisa mercenaria*, used for food in Mexico, but could not speak favorably of the flavor, this

being probably due to excessive dessication. Mr. Terry said he tasted "Kungu" cake made of a species of *Corethra*, which is collected in myriads in the lake district of Central Africa; the flavor and texture suggested oatmeal. Dr. Cobb stated that at one time a committee was appointed in Nebraska to experiment with grass-hoppers for food. The food was found palatable but its general introduction seems to have failed.

APRIL 6th, 1905.

The fourth regular meeting was held in the usual place, Mr. Perkins in the chair.

Papers.

Mr. G. W. Kirkaldy spoke on *"Stridulation in the Corixidae"* and subsequently presented the following brief note for publication:

"As early as 1727 Frisch announced that the common European Broad Water-Bug (*Ilyocoris cimicoides*, Linne) produced a fiddling sound with its neck; this has not been properly elucidated, however, up to the present. Last year Bueno of New York discovered the stridulatory areas in *Ranatra*. The first observations on Corixidae were recorded by Robert Ball of England in 1846 and the latest by Kirkaldy in 1901. (Journ. Quekett Micr. Club, Apr. 1901). The anterior tarsus is unjointed; it is flattened and dilated, in shape more or less like a knife blade. On the inner face of this tarsus there are in the males numerous chitinous pegs, which vary in number, form and position in the various species (constituting the most valuable and precise test of a species in this family). On the anterior femora there are rows, on the inner face, of small spines or pegs and it is by the friction of the tarsal pegs on the pegs of the opposite femur that the sound is produced. It was formerly supposed that the striated mouthparts were thus operated upon, but in 1901 Kirkaldy demonstrated the employment of the femoral areas. It is only in the males that these pegs occur. A further (supposed) stridulatory organ was announced in 1873 by F. B. White. This is a remarkable structure consisting of several (varying in form and number) more or less overlapping chitinous plates on a pedicel attached to one of the abdominal tergites. Kirkaldy thought that if this were really a stridu-

latory organ, it must operate during the nocturnal flights that these bugs frequently take, as it seemed impossible that it could operate under water. This organ also occurs only in the males, and not in all the species."

The remarks were illustrated by two microscope slides and by figures of the only Hawaiian Corixid, *Arctocorisa blackburni* (F. B. White) which has so far only been found in these Islands, although it belongs to a Central American and Antillean group characterized by the shape of the anterior tibiae in the males.

Mr. O. H. Swezey then read his *"Observations on Insects During a Recent Trip on Hawaii,"* illustrated by numerous specimens:

HYMENOPTERA

Sceliphron cacmentarium: No adults were seen, but the nests of this mud-dauber wasp were common, and they always contained larvae or pupae, which shows that this species is continuing the habit of hibernation which it had in the States, where it hibernates as larvae in the cells of its mud-nest.

Odynerus nigripennis: Very abundant. They gather the larvae of *Hymenia recurvalis* and other green caterpillars to store up for food for their young. Many other species of *Odynerus* are abundant.

Polistes aurifer and another species are everywhere in cane fields, feeding upon the "honey dew" deposited upon the cane leaves by the leaf-hoppers.

Xylocopa brasilianorum: This large carpenter bee is abundant and does considerable damage to fence and telephone posts and some buildings, especially such as are made of redwood lumber.

Ants: Swarms of them in cane fields, and they must consume a great many of the young leaf-hoppers.

Ecthrodelphax fairchildii: This leaf-hopper parasite was seen only in the plantations of Kau, one plantation of Kohala, and at Puako. Numerous attempts have been made to introduce it in the plantations of the Hilo and Hamakua Districts, but it apparently has failed to become established.

Chalcis obscurata,

Pimpla hawaiiensis,

Echthromorpha maculipennis, and

a Braconid: These four are parasites upon the larvae of *Omiodes accepta,* the cane leaf-roller. The Braconid is most abundant. *Echthromorpha* occurs only in the higher cane fields.

Centistes americana: Parasitic on *Coccinella repanda.* A few seen.

DIPTERA

Pipunculus sp:* This internal parasite of the leaf-hopper was found in all of the plantations of the island except Puako and most of those of Kohala.

Xanthogramma grandicornis: Common. Its larvae feed upon cane aphis and other species of aphis.

Volucella obesa: This large blue Syrphid very abundant everywhere.

Eristalis tenax: Only a few seen.

Eristalis punctulatus: Very abundant.

A Tachinid: Parasitic on *Omiodes accepta;* a few seen.

Lantana Fly (Agromyzidae): Has been introduced in Hamakua, and its work is showing.

LEPIDOPTERA

Omiodes blackburni: The palm leaf-roller is doing a good deal of damage to palms on the windward side of the island.

Omiodes accepta: The cane leaf-roller is found more or less everywhere, but is not injurious except in some of the highest fields, about 1200-1800 feet elevation. Parasites are doing good work in keeping it from getting worse.

Hymenia recurvalis: This moth is very abundant in cane fields, its larvae feed upon an Amaranth-like weed (*Euxolua*).

Lantana Moth: This apparently was introduced in Hamakua along with the lantana fly, and is helping it in preventing the production of lantana seed.

Cutworms: Are reported to be very destructive to garden crops.

Pieris rapae: Abundant in cabbage patches.

Vanessa tameamea: This beautiful native butterfly is abundant, especially above the 1,000 foot elevation.

Anosia plexippus: Very abundant in lower regions.

Lycaena blackburni: Scarce.

Lycaena baetica: Very abundant, its larvae feeding upon beans, crotalaria and other legumes.

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* Since described as P. *juvator* Perkins.

COLEOPTERA

Coccinella repanda: Common everywhere, especially in cane fields, feeding upon aphis and young leaf-hoppers.

Cryptolaemus montrouzieri: Common, feeding upon cane mealy bugs, and the mealy bugs of guava and alligator pear.

Rhizobius ventralis: Abundant, feeding upon mealy bugs on guava and alligator pear.

Platyomus lividigaster: Common, feeding upon aphis of various species.

Scymnus vividus: Common, feeding upon cane aphis.

Vedalia cardinalis: Two specimens seen at Ookala feeding upon cottony cushion scale.

Sphenophorus obscurus: Found on all sugar plantations, but not doing any special damage except in a few.

HEMIPTERA

Icerya purchasi: A few seen in Hamakua District.

Orthezia insignis: Was not seen on the island.

Trechocorys calceolariae: (Sugar-Cane Mealy-Bug.) A few on most plantations, but doing no special damage. Mealy bugs are very abundant on guava, palm, and alligator pear.

Aphis sacchari: Cane Aphis. A few found on most plantations but usually of not much significance.

Siphanta acuta: Very abundant, feeding upon coffee, mango, sumac, and other shrubs.

Perkinsiella saccharicida: Plenty of the leaf-hoppers on most plantations, but in most cases the managers consider them on the decline. This is probably due to the increase in abundance of their insect enemies.

Oechalia griseus: Common in the higher cane fields of Kau, feeding upon leaf-hoppers and leaf-rollers.

Zelus peregrinus: Common on the windward side of the island.

Reduvius blackburni: Common in the cane fields everywhere.

ORTHOPTERA

Anisolabis annulipes and

Chelisoches morio: These two earwigs feed upon leaf-hoppers, the former at the north end of the island and the latter more generally distributed.

Cockroaches: Several species abundant in situations they are respectively accustomed to.

Praying Mantis: Several egg-capsules were seen in the Hamakua District.

Gryllotalpa africanus: Not seen on the island.

Elimaea appendiculata: A few found in all Districts.

Xiphidium varipenne: Very abundant in nearly all of the plantations, but none at Puako. They live largely upon leaf-hoppers.

NEUROPTERA

Anax junius: Conspicuous everywhere.

A Hemerobiid: Common in cane fields.

Chrysopa microphya: This lace-wing fly abundant in many cane fields, also on trees and shrubs, feeding upon leaf-hoppers, mealy bugs, scale insects, and probably the nymphs of *Siphanta acuta.* Several larger species of lace-wing fly were found feeding on leaf-hoppers in fields at the higher elevations—1,600-2,500 feet.

MAY 11th, 1905.

The fifth regular meeting was held, Mr. Perkins in the chair. Dr. Walter Evans of Washington was present as a visitor.

Election of Member—Mr. Wm. Weinrich Jr., of Sisal.

Mr. D. L. VAN DINE read the following "*Notes on a Comparative Anatomical Study of the Mouth-Parts of Adult Saw-Flies.*"

In beginning the study of the mouth-parts of any group of insects, one naturally commences with the lowest or most generalized members, expecting of course to find the mouth-parts of these older forms to present the most generalized condition to be found in the order. Hence, in beginning a study of the comparative anatomy of the adult Hymenopterous mouth several years ago in the entomological laboratory of Stanford University, under the direction of Prof. Vernon L. Kellogg, the writer began on those of *Tenthredinidae.* A few generalizations on the drawings made in connection with the study may prove interesting to the members of this Society.

Following Cresson's list all the sub-families were studied with the exception of *Hylotominae.* The parts present difficulty in dissection for the reason that they are intimately joined or connected by a very efficient membrane or tissue. The exception is the mandibles which act independently. To further insure the mutual

action of the parts, this connecting membrane is supplied with certain highly chitinized portions which act presumably as "braces" or "connecting rods." The parts, as a whole, are very strong, being highly chitinized throughout. So much so, in fact, that it was found necessary to first boil them in caustic potash (5 per cent. solution) before attempting to study them.

The position of the mouth-parts on the head is ventral. The clypeus extends out over the parts with the exception of the mandibles, which fold together directly in front, and the distal ends of the maxilary palpi and the labrum-epipharynx.

That the parts do represent a generalized type may be seen by looking at those of *Lyda* sp. (Plate I, figure 1.) The parts are drawn *in situ* to give an idea of the comparative size of the different parts and their position in relation to each other. We have here mandibles (*md*), strong, highly chitinous, large in comparison to the other parts and acting independently. The view is ventral and the labium (*li*) is seen overlying the other parts. The mentum (*m*) is shield shape, the lateral edges being bent inward like the sides of a saddle. From the mentum extend distad the glossa (*gl*) and the paraglossa (*pgl*). Caudad of the mentum and lying in the connecting tissue is a portion that is chitinized and supplied with hairs. Until further studies of higher orders are made this part will be called the sub-mentum (*sm*), since in going from the lower to the higher forms this structure becomes more and more important and is in the family *Apidae* distinctly joined to the mentum. The tendency, however, is shown within the family *Tenthredinidae*. From the base of the paraglossa extend laterad on either side the labial palpi (*lip*). They are four lobed. There is an hypopharynx but it is not distinct in some species. It is well shown in drawings farther on.

Right and left of the labium lie the maxillae (*mx*). One of another species can be seen dissected out in Plate II, figure 4. This figure will serve equally well in describing the parts. This is figured for the reason that in *Lyda* sp. the cardo (*cd*) is not visible since it forms with the stipes (*st*) a right angle. The maxillae are not unlike the general type, that is, the cardo, stipes, galea, and lacinia are easily understandable. The stipes, as is also the mentum of the labium, is very much arched, making it difficult to show the true form by drawing one aspect.

Returning to *Lyda,* there can be seen lying directly beneath the parts and in the center, the distal end of the labrum-epipharynx (*lr-ep*). This is shown dissected out in Plate I, figure 2. The so-called "braces" of the labrum are in the form of two distinct bars.

Plate II, with the exception of figure 6, represents the parts of *Lygaeonematus erichsonii* dissected out. These parts are not drawn to scale for the great difference in size does not make this feasible. Figures 1 and 2 show, respectively, the left and right mandibles. They are articulated to the head by a condyle, shown in the figures. The mandibles are further connected to the head by mandibular ligaments, not well shown in the drawings of this saw-fly, but well seen in a species of the family Formicidae, genus *Aphaenogaster*, here presented for that purpose (Plate II, figure 6.) The mandibles, as in *Lyda,* are separate from the other parts. They are folded together when at rest, the difference in the structure of their inner margins making this possible.

The labium (Plate II, figure 3) is drawn from a dorsal or inner aspect. Here is seen a hypopharynx (*hyp*). In the membrane below occurs what has been called the sub-mentum (*sm*). Beneath the hypopharynx and lying beneath its curving edges, is the mentum (*m*). From it arise, as in *Lyda,* the glossa, the paraglossa, and the four-lobed labial palpi. The maxilla, shown in figure 4, has already been described. Attention should be called, however, to the connecting membrane which unites it to the labium.

Plate II, figure 5, shows the labrum-epipharynx. It possesses that peculiar chitinized portion extending in the membrane to the other parts. This structure is common to all saw-flies studied. It is called the "brace of the labrum," and has already been referred to. It varies from a structure consisting of two distinct bars to one where the two have become fused into one solid part. In *Lyda* (Plate I, figure 2) this "brace" is seen as two bars connected near the labrum. In *Lygaeonematus erichsonii* (Plate II, figure 5) there is noticeable a tendency towards separation and also in *Dolerus arvensis* (Plate I, figure 6). In *Tenthredo rufopectus* (Plate I, figure 5) the "brace" occurs as

one structure. Its function may be to strengthen the connection between the parts and insure their mutual action.

The aspect of figure 5 in Plate I is ventral to show the inner surface. This is the epipharynx on which occur the sense-pits of taste. These structures agree with the descriptions of the "pits" or "cups" and "hairs" of taste as given by Packard.

That part labeled sub-mentum (*sm*) in Plate I, figure 1, is shown greatly enlarged in figure 3. In a higher genus represented by *Macroxyela ferruginea* (Plate I, figure 4) we have the same structure more closely related to the mentum.

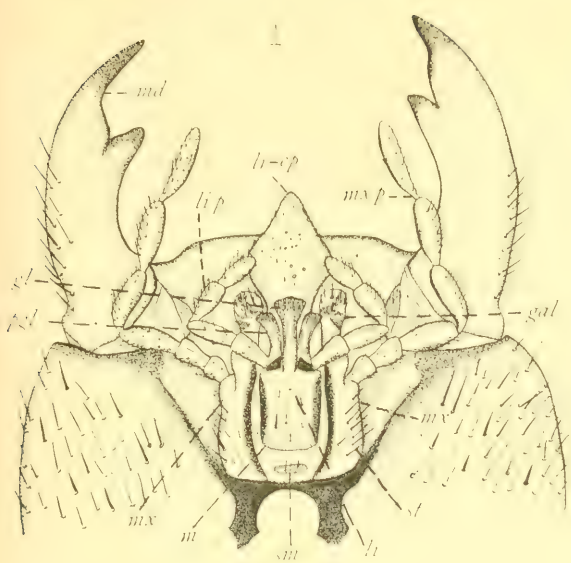
In Plate I, figure 3, is seen a chitinized portion of the membrane connecting the proximate ends of the cardo (*cd*). This structure was not followed out but it may be that it can be homologized to the lora in the honey-bee mouth-parts. The mouth-parts as a whole are plainly orthopterous in type and the various parts by their position and structure can be homologized but only in so far as the position and structure are concerned.

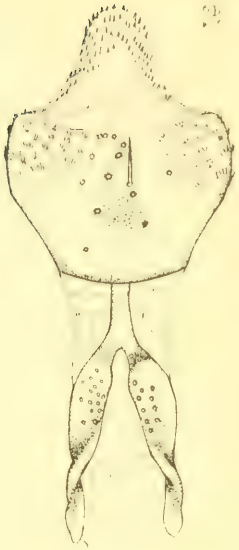
Exhibitions and Notes.

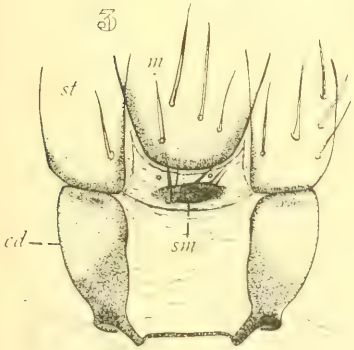
Mr. Perkins exhibited the male and female of a moth, a species of *Epipyrops*, together with their host, an Australian hopper. A study of the venation shows this species to be allied to Tineidae and Psychidae.

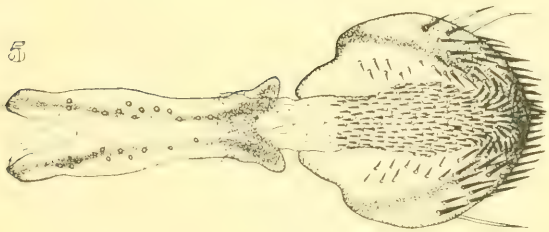
Mr. Kirkaldy exhibited a volume of a German translation of DeGeer's "Memoirs," published from 1770-1780. Mr. Kirkaldy related that DeGeer destroyed almost all the copies of the first volume of the original edition soon after it appeared; he also stated that it contains a good many notes on the habits of the insects treated of.

Dr. Evans related some interesting experiences with the fire flies (*Pyrophora*) in Porto Rico. He also spoke of the very injurious mole-cricket (*Scapteriscus didactylus* Latr.). The Porto Ricans are convinced that this mole cricket, or Changa as they call it, was brought there in a cargo of guano twenty-seven years ago. It is a strong flyer, burrows in the ground, is very destructive to all kinds of vegetation, and seems to prefer dry, loose, sandy soil.



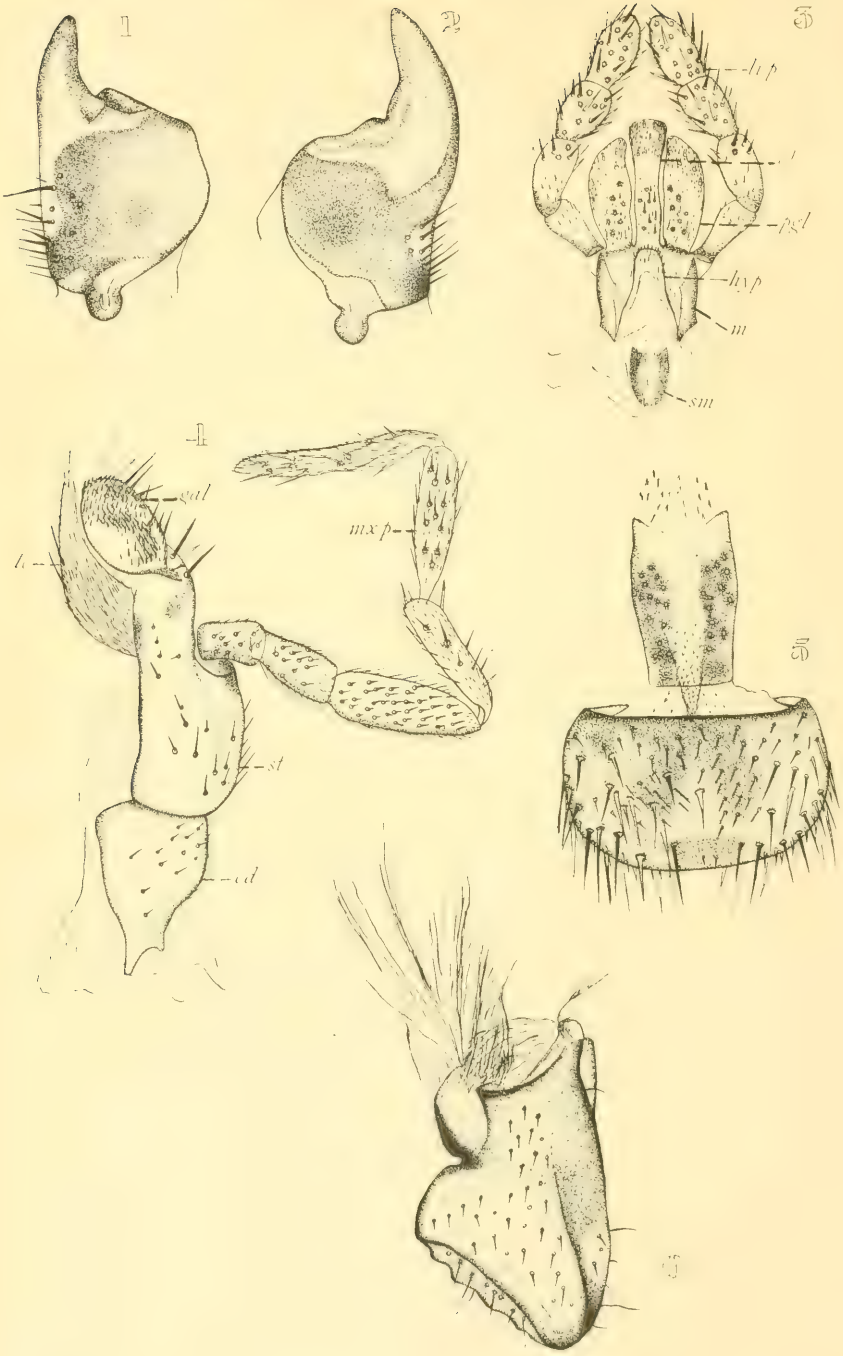






Van Dine Del.

MOUTH PARTS OF TENTHREDINIDAE.



Van Dine del.

MOUTH PARTS OF TENTHREDINIDAE.

JUNE 20th, 1905.

The sixth regular meeting of the Society was held in the usual place, Mr. Perkins in the chair.

Resolutions upon the death of Dr. Packard were presented:.

"*Whereas,* the Hawaiian Entomological Society has learned with deep regret of the irreparable loss to science of Dr. Alpheus Spring Packard, be it

'*Resolved,* That a vote of condolence be extended to the family of Dr. Packard; and that the same be recorded on the minutes of the Society.

D. L. Van Dine,
G. W. Kirkaldy,
Committee."

Papers.

Mr. R. C. L. Perkins read "*Notes on a Collection of Butterflies Made During a Recent Trip to Australia.*" The following is an abstract of his remarks:

He had always watched such butterflies as were around the cane-fields, and having made himself fairly well acquainted with the Australian species in Museums he had not the least difficulty in identifying most of the species on the spot, and confirmed these identifications subsequently.

Being in the Cairns district only in July and August, probably two of the worst months for butterflies, he saw only a fraction of the species that are found there. In all he observed in Australia between 80 and 90 species, the greater part at Cairns in the months mentioned. He observed that the well-known difficulty of killing the various species of Danainae extended to all those he observed, but he had noticed one specimen of *Anosia crippus* killed by some predaceous creature. Although birds were in numbers, and insects at their scarcest, he saw no bird attack any butterfly, though he was always on the watch for this. The resemblance between *Hamadryas zoilus* of the above subfamily, and the Nymphaline *Neptis staudingeriana* is quite remarkable, and the two fly together. Both were scarce no doubt simply because they were out of season. The pretty *Cethosia cydippe,* with *Cupha prosope* and *Atella egista* are all found in the scrub, on the edges of cane-fields. *Mynes geoffroyi* is very like females of the Pierid,

Delias nigrina superficially, so much so that when Koebele first went to Cairns years ago, the late Mr. Olliff asked him to look out for this Pierid. It is of course really Nymphaline, and the gregarious larvae and pupae in clusters, the former being very like the common English *Vanessa urticae* or *io*, are found on stinging-nettle trees. It is common, but the larvae are much destroyed by predaceous bugs.

Charaxes sempronius abounded from Cairns to Brisbane, wherever he stopped. It feeds on many trees, preferring Leguminosae. The larvae are parasitized by Ichneumons, and the eggs mostly destroyed by a *Teleas*.

Melanitis leda is a Satyrine, very leaf-like in repose. It varies enormously on the underside, and is generally like a dead leaf in colour, and its variations represent leaves in all stages of fungous attack. It settles abruptly on the ground, like some other leaf-butterflies. A conspicuous ocellated form, however, occurs, and is very little leaf-like. Lycaenidae are very numerous. The beautiful *Lampides caelestis* is common near Cairns; *Cyaniris tenella* was also noticed there; and a form of *Danis taygetus*, quite constantly distinct from the Richmond River form of this common butterfly, abounded; *Philiris kamerungae* abounds near Cairns and was seen swarming over the bushes, although it is a comparatively recently described species; the beautiful but very common *Arhopala amytis* was often noticed settling on the nests of the abominable green tree-ant (*Oecophylla*). The very common, but pretty, yellow butterflies of the genus *Terias* are interesting from their variability. The pink-suffused form of *T. herla* was noted at Cairns and Bundaberg.

Two *Elodina* very common at Bundaberg are interesting from their seasonal variation, but *Hubbina perimale* is still more interesting in this respect. A vast migration of *Belenois java* was witnessed on the Bundaberg coast. *Delias nigidius*, a local butterfly, abounds at Cairns. Several of the species of *Delias* can be bred in quantities from larvae on parasitic mistletoes.

The handsome blue *Papilio ulysses* is very common in Cairns district, and eggs, larvae and pupae were easily found.

Of the Hesperidae, about 16 species only were noticed, the least commonplace in appearance of these being the black and white *Erynnis caesina* and *Notocrypta feisthamelii*, which flew together

in the shade near Cairns with swarms of the beautiful *Lampides caelestis,* already mentioned.

Exhibitions and Notes.

Mr. Weinrich exhibited pupae and imagines of *Volucella obesa,* which he had observed breeding in the sisal juice. In the course of one-half to an hour's time perhaps 5,000 eggs were laid. Mr. Kotinsky referred to two species of Coccidae; one a Dactylopiine, the other an *Aspidiotus* which he had observed on manienie grass on Maui and Hawaii.

JULY 10th, 1905.

The seventh regular meeting of the Society was held in the usual place, Mr. Perkins in the chair.

Election of member—Mrs. Wm. Weinrich.

Exhibitions and Notes.

Mr. Wilder exhibited some lichee nuts and a moth which had issued from one of these. Mr. Perkins stated that while he could not name the insect, he was sure that it is the same species that commonly infested leguminous pods on these islands. Mr. Kotinsky said he has bred this insect from the pod of *Acacia farnesiana,* commonly called Mimosa or "glue." Mr. Wilder also showed a collection of insects made in his yard. Mr. Terry exhibited a collection of the more common insects, both sexes of each species being represented, in order to show the characteristic differences between the sexes.

Mr. Perkins exhibited a collection of native bees and wasps to demonstrate what, in his opinion, is the ideal way of mounting those insects. The wings and legs were spread uniformly, the insects being pinned with short silver pins on strips of white-papered cork or specially prepared white fungus, raised high on a long and stout pin. The insects need never be directly handled, and could be examined perfectly both above and beneath with a strong lens. Brother Matthias stated that he has also been in the habit for some time of using fungus found on kukui trees in place of cork.

Mr. Perkins exhibited a Phasmid from Mexico; this insect looked so much like a bit of brown, crumpled up leaf that even in the exhibition box great difficulty was experienced in recognizing that the object was an insect. He also exhibited two specimens,

one green, the other brownish, of a Phasmid from Fiji, the dorsal appearance of which resembled a leaf so perfectly that none but a trained eye could locate it in situ.

Mr. Swezey exhibited a series of the stages of *Zelus peregrinus* Kirkaldy from the egg to the imago and detailed the life-history and habits of this predaceous insect.*

AUGUST 3rd, 1905.

The eighth regular meeting was held on this date, Mr. Perkins in the chair.

Papers.

Mr. R. C. L. Perkins presented a paper on *"Food Habits of Native Hawaiian Birds."* The following is a brief summary:

The Hawaiian Birds are classed according to their food-habits as follows:

(1) Honey or nectar suckers; useful because pollinizers.
(2) Beneficial fruit-eaters which spread the seeds without injuring them, and propagate the native plants.
(3) Harmful fruit-eating birds, which destroy seeds they eat.
(4) Eaters of injurious insects; beneficial.
(5) Eaters of useful insects are practically unrepresented.

In the family *Drepanididae* there are 34 species on the Hawaiian Islands; 12 of these feed on nectar regularly; 2 are doubtful honey-eaters; 7 rarely eat honey, yet were seen eating it; they have honey-sucking tongues and are apparently leaving off the honey-sucking habit and are taking to insect-eating; 30 species eat noxious insects, certainly all of them feed their young on insects; most of these eat spiders which may be either beneficial or otherwise; 3 are beneficial fruit-eaters 3 are highly injurious fruit- or seed-eaters, yet these also eat caterpillars and feed them to their young, and are thus far beneficial; 2 species are indifferent.

Of the four Oo, 2 are chiefly honey-suckers, but also eat insects and one is chiefly an insect-eater; one is extinct. Most of these birds are now too rare to be of practical value.

Of the five thrushes, which are very fine songsters, four are largely fruit-eaters, but also devour insects; the fifth is an insect-

* Since published in Bull. H. S. P. A. Ent. I, pp. 232-4. Pl. XVI figs. 1-3.

eater confined to Kauai. There are three species of fly-catchers, all entirely insectivorous and very beneficial.

Exhibitions and Notes.

Mr. Swezey exhibited specimens of *Dacus cucurbitae* which he had bred from string beans; he also showed a red Tortrix, name unknown, but identical with the one bred by Mr. Wilder from lichee nuts and exhibited at the previous meeting. This moth Mr. Swezey has also bred from the pulp of mango. Mr. Swezey also presented interesting notes on the habits of *Callineda testudinaria,* since published in the Bull. H. S. P. A. Ent. I, pp. 224-8, Pl. XV., figs. 1-4.

Referring to *Dacus cucurbitae,* Mr. Craw stated that he had also observed this insect at work upon beans, and Mr. Perkins stated that Mr. Van Dine in his 1904 annual report refers to this same insect observed on the same plant. Mr. Kotinsky wondered at the possibility of raising melons or cucumbers anywhere on these islands in view of the unchecked presence of this fruit fly. To inquiries for remedies against this pest he always replied suggesting clean culture, destruction of infected parts and liberal feeding of the plants liable to injury by this insect. Mr. Weinrich stated that he had experimented with a tenth of an acre plot of melons. He covered some of the fruit as soon as it set, but afterward found that while some of the covered melons were stung, many of those uncovered were unstung. He suggested the possibility of raising melons on the windward side of this island by the prevalence of strong winds which drive the fly away. His experiment with raising musk melons was a total failure; one of these fruits showed absolutely no traces of the fly sting but was, however, full of the maggots when cut open. These maggots were small, and Mr. Swezey offered the suggestion that the puncture might have been a very recent one, which would account for the difficulty of discovering it. Mr. Austin stated that he saw musk melons that were raised near Diamond Head. The fly, he said, attacks the vine as well as the fruit of melons and cucumbers. Mr. Perkins also referred to an observation he made on wild figs in Australia, which he found so full of fruit fly maggots that they could not reach maturity. Mr. Terry stated that he observed at Kaimuki a kind of cucumber grown by the Chinese. To protect these from the ravages of the fly these people usually

wrapped the fruit in paper, twisting it only at the stem end of the fruit, the other end being left entirely exposed and yet the method seemed quite efficacious. Mr. Krauss of Kamehameha School (present as a visitor), stated that to his observation, *D. cucurbitae* is less injurious on windy days. The fly being erratic and food quite abundant, even an incomplete covering will suffice to check its ravages. He has also found useful hints in the use of resistant varieties of the fruits liable to attack. Mr. Clark of Wahiawa, and the Kamehameha School, are growing what are known as cherry-and plum-tomatoes which are free from attack by this pest. This is likewise true of a hard-skinned variety of squash which he is growing. He has also observed that the more extensive a field of a certain crop is, the less subject it is to attack. Mr. Craw stated that certain varieties of cherries in California are known to be immune to the San Jose Scale. Mr. Swezey said that in the course of his inspection work in Ohio he had found that sour cherries and Kiefer pears were always free from San Jose Scale. Mr. Austin has observed that rose bushes which he is growing within a slat house are absolutely free from injury by the Japanese beetle, whereas a single twig of this same rose that projected outwardly through the slats had its leaves injured by the beetle.

Mr. Perkins exhibited specimens and illustrations of certain leaf-hopper parasites (*Stylopidae*), which are described and figured in a bulletin soon to be issued, and made some further remarks.*

He said that though he had given an interpretation of the mouth parts, different from that of Eaton, he was prepared to find that the latter might be right, or both wrong. Thus it was quite possible that the true mouth was what he called the "foramen" in his figures. This occupied a half-way position, between those assigned to the mouth opening by Eaton and himself. The study of the puparia and of the parts of the immature insect within, as well as of the parts of the female head in the Xenini would very likely conclusively settle the point, but he had not yet had time to make the necessary study of these. It was quite clear that the head-parts in the adult males and females, and the less distinct ones in the puparium, could be homologized.

Mr. Perkins further stated that years ago he had observed that

* See Bull. H. S. A. Ent. I, pp. 86-111, Pls. 1-4.

some carpenter bees from India had in the basal abdominal segment a chamber, which was always full of Acari; the females alone possess this acarid cavity. The relation of these acarids to their hosts is uncertain, Mr. Perkins believing that they are injurious. A Mexican wasp (*Odynerus*), which he had also examined, had a special Acarid chamber formed by a modification of the second abdominal segment, where it is overlapped by the first; he exhibited also an Australian wasp in which this cavity was located in the posterior face of the propodeum.

SEPTEMBER 14th, 1905.

The ninth regular meeting of the Society was held at the usual place, Mr. Van Dine in the chair.

Exhibitions and Notes.

Mr. Kotinsky remarked that the work of compilers of lists, etc., of groups of insects is undoubtedly commendable, and to the workers in those groups very useful, but like everyone else they are likely to commit errors. Among the most regrettable of these is the tendency to alter names without apparently satisfactory reason or authority. To illustrate, he cited the following instance: In the Transactions of the New Zealand Institute Vol. XXVII p. 46, Maskell reports *Mytilaspis pallida* var. (?) "on *Podocarpus,* Hawaiian Islands from Japan." In the American Naturalist Vol. XXXI p. 704 (1897), Cockerell, referring to this variety, names it *maskelli.* In compiling his list of Coccidae for the Fauna Hawaiiensis in 1902, Kirkaldy disregards Maskell's "variety (?)", apparently overlooks Cockerell's note upon this variety, and reports *"Lepidosaphes pallida* on *Podocarpus,* Hawaiian Islands from Japan." As a result, Mrs. Fernald in her "Catalogue of the Coccidae" credits *"Podocarpus,* Hawaiian Islands from Japan" with both *L. pallida* and its variety *maskelli.* the one on the authority of Kirkaldy, the other of Maskell. While *L. pallida* probably exists upon these islands, Kirkaldy apparently had no authority for his record.

Mr. Kotinsky also stated that through the courtesy of Dr. Russel, who is now in Japan, a colony of *Chilocorus similis* Rossi was received from that country, three adults and five pupae arriving in good condition. The imagines issued from these pupae shortly after arrival and subsequently the colony was reduced to

five vigorous beetles. As *Diaspis pentagona* and *Aspidiotus perniciosus* are the principal hosts of this Coccinellid, and as the breeding place of neither of these species was then known, their food problem was solved by the selection of *Aulacaspis rosae,* as this was accepted readily, and the females of the colony soon commenced to lay eggs. At the present time fifteen beetles have been brought to maturity and a large number of eggs, larvae and pupae are in a thriving condition. Several days ago Mr. Austin discovered at Mokuleiia a number of peach trees badly infested with San Jose scale. Twigs of these were secured, and supplied the beetles with food which they seemed to welcome. In course of his work with the rose scale as food for *C. similis,* Mr. Kotinsky observed *Rhizobius tozoombae* Blackburn, breeding freely on the rose scale. On a bit of twig not four inches long and about one-fourth of an inch in diameter freshly brought in from a field, he counted eleven larvae of this Coccinellid and many more have issued since. This same Coccinellid he also observed in abundant numbers upon *Chionaspis rhododendri* Green, on *Poinciana pulcherrima* and *Waltheria americana.* He also stated that he had bred the Chalcid *Aphelinus fuscipennis,* from almost every Diaspine that came under his observation. In the near future he hoped to publish a full list of its hosts on these islands.

OCTOBER 15th, 1905.

The tenth regular meeting of the Society was held at the usual place, Mr. Perkins in the chair.

The Secretary read a congratulatory note to the Society from the Honorary Secretary, Mr. R. J. Wiggelsworth, of the Manchester Entomological Society.

Exhibitions and Notes.

Mr. Kirkaldy took exception to Mr. Kotinsky's note, re *Lepidosaphes pallida,* at the last meeting and expressed his opinion that the status of the species was as follows:

1. *L. pallida* (Maskell 1805)
   =*maskelli* (Cockerell 1897)

Found in the Hawaiian Islands.

2. New name wanted, if really distinct—
   = || *pallida* Green 1896 (not Maskell 1895)

Not found in the Hawaiian Islands.

Although usually ascribed to Green, the author of *pallida* must be held to be Maskell, since he was the first to describe it. The confusion arose, as in so many other cases, from the distribution of new forms under manuscript names, long before publication.

Mr. Kirkaldy also exhibited specimens of the following water bugs.

Laccotrephes sp. from Lake Tanganyika, Africa, showing enormously long breathing tube.

Belostomatid from Assam.

Amorgius indica from India, and

Ranatra chinensis from Yokohama.

Mr. Craw announced that *Scutellista cyanea* had been introduced and successfully bred on *Saissetia nigrum* upon *Hibiscus* in a cage. Several of these plants were transferred to Kapiolani Park, where this scale abounds, for further propagation. He was pleased to observe evidences of work by this parasite upon the identical scale in the park from specimens released there some five weeks ago. It was interesting to note that this insect had completed a life cycle upon these islands in about 30 days, whereas it required from 40 to 47 days to do so in California.

Mr. Kotinsky stated that he had bred *Spalangia hirta* Haliday, from pupae of *Haematobia serrata* collected on Oahu and Molokai on elevations ranging between a hundred and eighteen hundred feet. Of the Molokai pupae about 60 to 75 per cent. were found parasitized. To his knowledge Mr. Terry had bred the same parasite as well as *S. lanaiensis* Ashm. from dipterous pupae collected in horse droppings at the Volcano House, Hawaii. Identifications of the parasite were kindly made by Mr. Perkins and by Dr. Ashmead of Washington.

NOVEMBER 2nd, 1905.

The eleventh regular meeting of the Society was held on this date, Mr. Perkins in the chair.

The chairman appointed Messrs. Giffard and Kotinsky to consider the advisability of having public lectures on Entomology delivered at least once a year.

Exhibitions and Notes.

Mr. Kotinsky stated that a bit of twig and leaves received a few days ago from Mr. E. H. Edwards of Kona, and labelled "Giant lemon from Fiji," was found plastered by (*Lecanium*) *Coccus viridis* (Green). Of the entire lot, only one specimen was observed showing evidence of having been parasitized. Since Mr. Green, the author of the species, reports the insect as one of the most destructive enemies of coffee plants in Ceylon, he was inclined to regard the discovery of its establishment in Hawaii with some alarm. It is true Mr. Green reports that about 90 per cent. of the insect is destroyed by a fungus disease during the rainy season. There is nothing to indicate that that useful fungus was introduced with the pest into Hawaii. Mr. Green also records some four species of Hymenopterous parasites bred from *C. viridis* in Ceylon, but so little is known about the scale in Hawaii that he was not even aware whether any of those parasites were brought along, nor could he tell whether the scale insect parasites already here will take readily to the new-comer. In view of these facts, he had been commissioned by Mr. Craw to proceed to Kona at the first opportunity and make the necessary investigations.

Mr. Perkins expressed the doubt that any *Lecanium* could become a serious pest on these Islands in view of the large variety of their enemies introduced and established here by Mr. Koebele.

Mr. Kotinsky also reported the finding of (*Lecanium*) *Coccus mangiferae* (Green) in injurious numbers upon the Alfons (Indian) variety of mango in the Moanalua Gardens. Mr. Craw believed that he had observed the same scale upon trees in Mr. Giffard's yard; Mr. Giffard thought that such would not be impossible, since he has frequently exchanged plants with the Gardens.

Mr. Giffard exhibited a female of what is probably a species of *Microcentrum* collected in his house on October 24, 1905. This is the first specimen of the species to have been collected in the Hawaiian Islands, which would indicate that it is a recent introduction.

Mr. Craw stated that he is keeping some 250 boxes or oranges from Japan in quarantine, the oranges being infested with some six species of scale insects. Mr. Perkins advised the breeding of parasites from these scales and releasing them, as he had already

done this with scale imported on plants from Fiji and elsewhere.

Mr. Perkins exhibted a collection of insects recently made by Mr. G. P. Wilder on Midway and Laysan Islands. Following is a list of the exhibit:

LEPIDOPTERA

Agrotis saucia. Laysan.
Agrotis sp? Laysan.
Prodenia sp? Midway.
Plusia verticillata. Midway.
Hymenia recurvalis. Laysan.
Pterophorid sp? Laysan.

DIPTERA

A small Acalypterate Muscid. Laysan.
A small Tachinid. Midway.

HYMENOPTERA

Eupelmus sp? (Chalcididae.) Laysan.
Tetramorium guineense (Myrmicidae). Laysan.

NEUROPTERA

Chrysopa sp? Midway.

COLEOPTERA

Thallattodora insignis. Midway.
Pentarthrum sp? Midway.

Mr. Perkins remarked that Mr. Wilder had very little time to collect insects on Midway and practically no time on Laysan. With regard to the species now exhibited, *Agrotis saucia* is a very widely destributed and injurious species and is common in the Islands. The second *Agrotis* is one of the most obscure species of that enormous and most difficult genus, and evidently allied to our Island forms. The *Prodenia* is hardly separable from a Mexican species, also exhibited. *Hymenia recurvalis* is one of the commonest Hawaiian moths, and also very numerous in Queensland and the Malay Islands. The small Pterophorid is also of the commonest Honolulu species. The Acalypterate Muscid is an abundant Honolulu species; the Tachinid probably identical with one of ours, and parasitic on *Plusia.* The *Eupelmus* is a male unique, and very likely the same as one of our several species. The ant is a cosmopolitan species. The *Chrysopa* is not like any

species now found on the Islands, but it might be the *C. occanica* of Walker, gathered by the Beechey expedition three quarters of a century ago. If not, it is no doubt new, and in any case interesting. The Coleoptera are represented by the two Cossonidae from Midway, the first being identical with the unique specimen from Lanai described by me in the Fauna Hawaiiensis; the second is a commonplace *Pentarthrum,* possibly the common *P. obscurum* of these Islands. I advised Mr. Wilder not to collect the Dermestids found in dead birds, the Sarcophagid flies, etc., as I had previously seen such from Laysan and they were of little interest, though most abundant there. But for this he would no doubt have obtained more specimens and species in spite of the limited time.

Mr. Perkins further exhibited six female specimens of *Reduviolus,* two from Oahu, two from Molokai, and two from Hawaii. He said that according to Mr. Kirkaldy's views in the Fauna Hawaiiensis these would all be placed under *R. lusciosus,* but that in his opinion these six individuals represented four distinct species, since they exhibit marked differences in the structure of the terminal segments. It was observed that while the two Oahu examples agreed together exactly, as also did the two from Molokai, the two from Hawaii were not alike, and were also unlike those from Molokai or Oahu, and that these sexual differences were accompanied by other quite evident but more superficial distinctions in each case.

Mr. Perkins also exhibited two specimens and drawings of a Chalcid parasite, and its host, an Australian Jassid leaf-hopper, being one of the two species of Chalcids known to be parasitic on nymph or adult hoppers. The form exhibited represents a new genus and species, which he proposed to describe as *Neocladia howardi.*

DECEMBER 7th, 1905.

No regular meeting was held on this date, owing to the lack of a quorum.

APPENDIX.

LITERATURE OF 1905 DEALING WITH THE HAWAIIAN ARTHROPODA.

Compiled by G. W. Kirkaldy.

1. Craw, A.: "Fighting Insect-Pests with Insects"; Haw. Forester II 321-5 (Nov.)

2. Hampson, G. F.: "Catalogue of the Noctuidae in the Collection of the British Museum," V 1-634, Plates LXXVIII-XCV. The Hawaiian Noctuidae of the subfamily Hadeninae are redescribed, in some cases the nomenclature being altered.

3. Higgins, J. E.: "Citrus Fruits in Hawaii"; Bull. Hawaii (U. S.) Exp. Sta. 9 pp. 1-31 Pls. I-III, figs 1-7.

p. 25-6 *Mytilaspis citricola* [recte *Lepidosaphes beckii*], fig. 7; p. 26 other Coccidae; p. 26-7 Orange-aphis; p. 27 *Phytoptus oleivorus*.

4. Kellogg, V. L.: "American Insects."

P. 308. Danger of yellow fever due to presence in Hawaii of *Stegomyia fasciata*; on p 451 it is mentioned that *Anosia plexippus* (figured) is the commonest butterfly throughout the Hawaiian Islands.

5. Kotinsky, J.: "Entomological Notes", &c.; Haw. For. II, 266-9 (Sept.), 295-9 (Oct.), 361-4 (Nov.)*, 397-404 (Dec.).

6. Perkins, R. C. L.: "Leaf-hoppers and Their Natural Enemies"; Bull. H. S. P. A. Ent. 1, Part 1, Dryinidae, pp. 1-69 (May 27), Part 3, Stylopidae, pp. 86-111, Pls. 1-4 (Aug. 8), Part 4, Pipunculidae, pp. 119-57, Pls. 5-7 (Sept. 9), Part 6, Mymaridae, &c., pp. 183-205, Pls. 11-13 (Nov. 13).

7. Schouteden, H.: "Monographie du genre Coleotichus"; Ann. Mus. Hung. III 317-60, Pls. 8-9.

pp. 319, 320, 325-8, Pl. 8, f. 20, *C. blackburni* (sic!).

8. Smith, J. G.: "Annual Report of the Hawaiian Agricultural Experiment Station, 1904"; Rep. U. S. Office Exp. Sta. 1904, pp. 372-9. (Entomological work. D. L. Van Dine.)

Lists of insects injurious to Sugarcane, Coffee, Citrus, Avocado Pear, Tobacco &c.

9. Swezey, O. H.: "Leafhoppers and Their Natural Ene-

*Reprinted as "Circ. Ent. Board Agr. Hawaii" 2, pp. 1-4, 4 figs.

mies. Part VII, Orthoptera, Coleoptera, Hemiptera." Bull. Ent. H. S. P. A., 1, pp. 207-38, Pl. 14-17 (Dec. 30).

10. Terry, F. W.: "Leafhoppers and Their Natural Enemies. Part V. Forficulidae, Syrphidae and Hemerobiidae," l. c., 159-81, Pls. 8-10 (Nov. 13).

11. Van Dine, D. L.: "A Partial Account of Insects Affecting Tobacco in Hawaii"; Hawaiian For. II, 31-6, figs. 1-2 (Feb.), 76-9, f. 3 (Mar.), 98-9, f. 4 (Apl.), 162-6, f. 5 (June).

12. Van Dine, D. L.: "Insect Enemies of Tobacco in Hawaii"; Bull. Hawaii (U. S.) Agr. Sta. 10, pp. 1-16, fs. 1-6, (dated May 31).

13. Van Dine, D. L.: "The Mango Weevil in Hawaii. *Cryptorhynchus mangiferae* Fabr." Haw. For., II, 231-3 (Aug.).

14. Van Dine, D. L.: "The Introduction of the Mango Weevil," l. c., 313-5 (Oct.).

15. Van Dine, D. L.: "Fuller's Rose Beetle (*Aramigus fulleri* Horn). Press Bull. Haw. (U. S.) Agr. Sta., 14, pp. 1-8, 1 fig. (Oct. 19).

16. See also Smith J. G.

Notices of the Hawaiian Entomological Society have appeared in

Haw. Forester, II, 50-3 (Feb.), 87-8 (March).

Entomologist, XXXVIII, 120 (April).

Entomological News, XVI, 121-3 (April).

PROCEEDINGS

OF THE

Hawaiian Entomological Society

I

PART 2

HONOLULU, DECEMBER, 1st, 1906

PRICE, 50 Cents

Hawaiian Entomological Society

Founded 1905

List of Officers for 1906

President.....R. C. L. Perkins

Vice President.....G. W. Kirkaldy

Secretary-Treasurer.....Jacob Kotinsky

Members of Executive Committee.....Otto H. Swezey, D. L. Van Dine

Editors of the Proceedings.....G. W. Kirkaldy, Otto H. Swezey

Membership, 1906

*Austin, C. J.
Chambers, W. E.
Cobb, Dr. N. A.
*Craw, A.
Davis, E. H.
*Eckart, C. F.
*Giffard, W. M.
*Hosmer, R. S.
*Kirkaldy, G. W.
†*Koebele, A.
*Kotinsky, J.
Muir, F.
†Newell, Bro. Matthias
*Perkins, Dr. R. C. L.
Peterson, Miss M.
*Swezey, O. H.
*Swezey, Mrs. O. H.
*Terry, F. W.
*Van Dine, D. L.
Weinrich, Jr., W.
Weinrich, Jr., Mrs. W.
Wilder, G. P.

*Original. †Honorary.

PROCEEDINGS

OF THE

Hawaiian Entomological Society

I

PART 2

HONOLULU, DECEMBER, 1st, 1906

PRICE, 50 Cents

PROCEEDINGS

OF THE

Hawaiian Entomological Society

JANUARY 4th, 1906.

The twelfth regular, and first annual, meeting of the Society was presided over by Mr. Craw.

Mr. Kotinsky read his reports as Secretary-Treasurer. During the eleven meetings held by the Society in the course of its first year, there was an average attendance of seven and one-half. There was a balance of sixty-seven dollars and eighteen cents ($67.18), plus an accrued interest of two dollars and eighty-two cents, ($2.82), making a total of seventy dollars ($70.00).

Notes and Exhibitions.

Mr. O. H. Swezey exhibited a specimen of *Rhyparobia maderae* (Fabricius), a large cockroach new to the Hawaiian Islands, and read the following notes:

An adult specimen of this large roach was taken on the evening of December 3d, 1905, at Pahala, Hawaii. It was in the house of the manager of the plantation, and was captured as it ran across the sitting room floor.

The species is not mentioned in the "Orthoptera," of the "Fauna Hawaiiensis" (1899), nor have I found any other Hawaiian record.

It is a native of Madeira and the west coast of Africa, and was described by Fabricius as *Blatta maderae*, in 1781. In 1838, Burmeister placed it in the genus *Panchlora*, and in 1892, Krauss created the genus *Rhyparobia* and assigned this species to it. By Kirby's "Catalogue of Orthoptera" (1904), there are eight species of *Rhyparobia*, all African.

R. maderae has become cosmopolitan, being carried by commerce. It has been reported from the Madeira and Canary Islands; Senegal, Africa; Cuba; Hayti; Brazil; Java; Philippines; and Great Britain. It is rare in the latter country, an occasional

specimen being taken at the docks in London, and at Covent Garden Market. (Burr, "British Orthoptera," p. 27, 1897). At a meeting of the South London Entomological and Natural History Society, Mr. W. J. Lucas exhibited specimens among some "recent uninvited visitors to Kew Gardens, from the Belgian Congo." (Entomologist, XXXII, p. 43, 1899.)

I find no records of the occurrence of this species in the United States; but J. B. Smith, in his Catalogue of New Jersey Insects (1899), mentions two related species, *Panchlora viridis* Burm., and *P. exoleta* Burm. as "found occasionally in cities and towns imported with tropical fruits." Another near relative, *Leucophoea surinamensis* (Fabr.), has been reported from New Orleans, eating palms and ferns in a green-house; and from Puerta Gorda in the extreme south of Florida (Insect Life, V, pp. 201, 268, 1892).

Mr. Kotinsky stated that Mr. A. N. Caudell, Orthopterist of the U. S. National Museum at Washington, had determined the pink-winged Tryxalid to be a species of *Atractomorpha**.

FEBRUARY 8th, 1906.

The thirteenth regular meeting of the Society was presided over by Mr. Perkins, who appointed Mr. Kirkaldy as Vice President for the current year.

Notes and Exhibitions.

Mr. Kotinsky exhibited specimens of *Samia cecropia* bred from pupae imported from the United States and intercepted by Mr. Craw, also specimens of the Coccid *Saissetia nigra* on fig.

The following Presidential address for 1905, was delivered by Mr. R. C. L. Perkins:

The Insects of Tantalus

As a subject for the Annual Presidential Address I have chosen to give an account of the endemic insects, that are found on that part of the Honolulu mountains known as Tantalus and

* Since identified as *A. crenaticeps* Blanch. by Mr. Swezey and confirmed by Mr. L. Bruner. This species is found in Australia and New Guinea, and has been accidentally introduced into the Hawaiian Isles.

its adjacent slopes. The subject will necessitate my giving long lists of scientific names, and is consequently not an attractive one to listen to, but I think the account will be found of considerable practical value to members who are interested in the native Hawaiian fauna, as, indeed, it would be to any transient entomologist having a few days or weeks to spare in entomological work. I may say that Tantalus is a rich locality, much richer than many other parts of this island, which would appear more attractive and productive on account of their far finer and more extensive forest. It is too, very accessible up to 1500 feet elevation, either by riding, driving or walking, and the actual summit can be reached in an hour and a half on foot from Honolulu itself. By "Tantalus" in this paper I mean the peak itself and all its slopes, *i. e.*, all the ridges that lead up from the plains to its base, as well as the steep side running down into the Pauoa valley and similarly the steep side bordering Manoa, but these two valleys themselves are not included. The main range lying behind Tantalus is entirely excluded. It is much wetter and more windswept than the latter and has, as is usual under these conditions, a scantier fauna, though some of its species are peculiar, while the Tantalus region has many that are not found on the highest mountains. For instance I may cite the six fine species of Longicorns belonging to the genera *Callithmysus*, *Plagithmysus*, and *Clytarlus*, which are entirely absent from the higher elevations, not being found at an elevation greater than that of the summit of Tantalus, and more usually some hundreds of feet lower still.

No doubt in 1892 when I first spent a day in collecting on Tantalus, it was decidedly a better collecting ground than today, the changes that have taken place since that time being very great. It was not, however, until 1900 that I did any systematic collecting in this locality, and in the past five years again I notice many changes all tending to its impoverishment as a collecting ground. Still at present these are not so great as to lead one to suppose that any species have been exterminated, and in fact it is extremely unlikely that such has been the case, since I ceased collecting in 1902. A recent visit leaves no doubt in my mind on this point, but it would not be at all surprising to find, now the locality is comparatively thickly inhabited, that in a few years the native fauna will considerably decrease.

Before taking the orders of Insects seriatim and listing the species found on Tantalus, it is proper to say that, excepting the Aculeate Hymenoptera and in a rather less degree the beetles, no serious attempt has been made by me to acquire a complete collection of insects frequenting the locality. Practically my whole collection thence was obtained incidentally to special researches on the variation of certain species of Coleoptera and other insects and on the habits and foodplants, etc., of these.

I will first take the species of Macrolepidoptera, that is to say, the butterflies and moths, excepting the Tortricina, Tineina and the Pterophoridae, which three groups I cannot at present name. The species here listed are such as I have myself met with on the slopes of Tantalus, but I believe that nearly all the species of Macrolepidoptera known on Oahu might be found there, either regularly or as stragglers, since the larger moths are not usually much localized in their range on the island they inhabit. Most of my work on the Lepidoptera of Oahu has been done in the mountains behind Waialua and to a less degree in the Waianae Mountains.

Of the stout-bodied night flying moths of the family Noctuidae, I can report very few, but others are certainly to be found. *Leucania euclidias*, a species remarkable for its variation in colour, is of course found, as in all other mountain localities throughout the islands, and is well worth examining in numbers for the more beautiful and unusual varieties. *Leucania amblycasis* is found as far down as the plains and could no doubt be taken in numbers on the flowers of the Ohia at night, as in other parts of the islands. It is hardly distinguishable from the moth of the "army-worm" (*L. unipuncta*). Once I saw it in countless thousands on those flowers, but mistaking it for the common pest I took only a few examples. *Agrotis dislocata* and *A. crinigera*, the produce of two of our commoner cut-worms, are naturally present, and I obtained one handsome specimen of the more recently described *A. hephaestea*. *Hypenodes altivolans* is common and worth examining for its remarkable variations in colour; it comes to light and sugar, just as the very similar *H. costaestrigalis* does in England. No other Hawaiian Noctuids visit sugared trees. *Nesamiptis obsoleta*, an extraordinarily variable species, abounds, *Cosmophila noctivolans*, also variable, is worth collecting in series, with the allied but not endemic

C. sabulifera, a highly variable form. The caterpillars feed on Hibiscus, and are sometimes very abundant on the 'Hau' trees.

The unique *Plusia pterylotis*, a remarkable species of this beautiful genus, was obtained on Tantalus (where a second very worn specimen was seen) and might no doubt be collected in numbers. Of the Hydriomenidae the considerable genus *Eucymatoge* has so far yielded only *E. monticolans*, which is often seen resting with expanded wings on the trunks or branches of trees. It is so highly variable in colour, as to be worth collecting, for some of the forms are so different in appearance, as to appear quite distinct species. No doubt other species of *Eucymatoge* occur, *e. g.*, the rather curiously shaped *E. staurophragma*, which elsewhere is found amongst Ieie (*Freycinetia*).

The Selidosemidae are well represented on Tantalus, the extensive genus *Scotorythra* having many species. *S. caryopis*, remarkable for the great sexual distinctions, is very common, and exhibits several noteworthy varieties. *S. hecataeā* and *homotrias* are larger and much less common, but allied to the preceding. A single male, taken a year or two ago appears to belong to an undescribed species, and may be allied to *S. demetrias* of Hawaii. Other species that are found are *S. dissotis*, *S. metacrossa*, *S. triscia*, *S. nephelosticta* var. *cocytias*, together with some that have taken to feeding on introduced plants (*e. g.* guava), *S. diceraunia*, *S. brachytarsa*, and *S. vara*. Many of these species yield extraordinary variations in colour. The larger *S. euryphaea* is less common. The two commonest koa-feeding species are *S. caryopis* and *S. rara*. The two finest species of the family, however, are the great *Acrodrepanis megalophylla* and the very pretty *Nesochlide epixantha*, the latter being common in the male sex, but the females rarely seen. I have only twice seen the latter at large and curiously enough both of these on the wing in the daytime, one of them only the other day on Tantalus, the other in the mountains behind Waialua. Whereas the male is readily attracted by flowers of the Ohia and to light, the female apparently comes to neither of these attractions. *Sisyrophyta gomphias*, remarkable for the curious secondary sexual characters of the male, is common, even in the forest of introduced trees planted by the Government. The caterpillar of the handsome Sphingid *Deilephila calida* is ofund feeding on various trees, "ohia," "koa," *Bobea elatior* and

others, being polyphagous. The moth itself occasionally is seen on lantana flowers.

The two butterflies, *Vanessa tammeamea* and *Lycaena blackburni* are common, as also their caterpillars, the former on Pipturus, the latter on "koa," and on *Dodonaea viscosa*, as well as on introduced pod-bearing trees—the monkey-pod tree and others.

In the Pyralidina at least two species of *Talis* are found, one of them only on the low dry slopes, and the conspicuous green *Margaronia exaula* flies wildly by day or night in ferny places. Its larva equally conspicuous in colour is found on the native *Euphorbia* trees and likewise attacks introduced species. Of the important genus *Omiodes*, *blackburni*, *epicentra*, *accepta*, *continuatalis*, *demaratalis*, *monogona* and *localis* all occur below the native forest as well as (at least most of them) in it. *O. euryprora* was once taken. Most of the species are to some extent of economic importance, and no doubt rarer species are to be found, such as *antidoxa*, *monogramma*, etc.

The genus *Phlyctaenia* yields five species; others no doubt only want looking for. *P. synastra* is a very pretty species, and the other four are *P. monticolans*, *nigrescens*, *stellata* and *despecta*, the latter being extremely common. *Pyrausta constricta* is not common but varies much in colour, and *Mecyna aurora* is taken in single specimens occasionally.

The species of the genus *Mestolobes* are very interesting, and as none have been bred, their habits should be studied. *M. xanthoscia*, *semiochrea*, *abnormis*, *autodoxa* and *antichora* all occur here, frequently visiting the Ohia flowers, while the abundant and ubiquitous *M. minuscula* ranges down to the plains. Of the allied genus *Orthomecyna*, only *crossias* has been taken, but no doubt other species are to be found, as is also the case in the big genus *Scoparia*. Of the latter only *S. balanopis*, *mesoleuca*, *catactis*, *ianthes*, *bucolica*, *hawaiiensis*, *melanopis*, *meristis* and *halmaea* have occurred, but it must be said that no special collecting of *Scoparia* has been attempted on Tantalus. The microlepidoptera cannot be dealt with at present, but at certain seasons the Tineina are very numerously represented.

HYMENOPTERA.

The Aculeate Hymenoptera of the lowest slopes of Tantalus have as yet been little studied, the forest-frequenting forms have

been more assiduously collected, and of the latter class probably not many additions are to be expected.

Of the Fossores *Nesomimesa antennata*, preying on daddy-long-legs of the subfam. Limnobiinae, is very common, and was collected nearly a century ago by the early explorers. A species of *Deinomimesa* should occur, since on the other islands the two genera are found together. *Crabro tumidoventris*, *monticola*, *unicolor*, and *notostictus* are all present, and the three latter are more noticeable amongst the guava scrub of the lower ridges. The very rare and singular *Crabro abnormis* should be looked for. I have found it at elevations of about 1500 feet elsewhere, but not on Tantalus, though Blackburn's type was taken hard by.

Nesocrabro stygius flies on the higher ridges, that are covered with "Ieie," and preys on the metallic green flies of the genus *Dyscritomyia* and *Prosthetochaeta*.

Fourteen species of *Odynerus* have been found, including four of the rarest species. Three of these, *O. leiodemas*, *eucharis*, and *homocophanes* are red and black species, and fly in company with three similarly coloured but common species—*O. pseudochromus*, *O. pseudochromoides*, and *O. oahuensis*. I always keep a special lookout for these rare species and usually take a specimen of one or more of them on each of my visits to Tantalus. The other choice species is *O. illudens*, a black species, which exactly resembles *O. montanus* and other common species superficially, and flies with these. *O. unicus*, *rudolphi*, *montanus*, and *nigripennis* are generally distributed, whilst *threnodes*, *oblitus*, and *dubiosus* are more abundant on the lowest slopes and plains.

The bees of the genus *Nesoprosopis* are *facilis*, *difficilis*, *anthracina*, *koae*, *fuscipennis*, the parasitic *volatilis*, and the rare and remarkable *anomala*. The latter, one of the finest and most interesting of the native bees, I have taken in the forest of introduced trees, and once I saw it on Tantalus itself. It is a very desirable insect. The single native ant *Ponera perkinsi*, is found in shady or damp places and is common. Its communities consist rarely of more than a dozen individuals.

The parasitic Hymenoptera are very imperfectly known. There are two species of *Scleroderma*, and three of *Sierola* at least, amongst the Bethylidae. They are no doubt parasitic on *Cis* and possibly other small beetles, and they may frequently be bred from deadwood infested by these.

A *Pseudogonatopus* is parasitic on small Delphacids and apparently does not differ specifically from the somewhat variable species found on the other islands. *Echthrodelphax fairchildii* is also commonly parasitic on two or three species of the same leaf-hoppers. One or two species of Cynipids have been taken, probably species of *Aglaotoma*, and most likely parasitic on the larvae of the small flies of the genus *Drosophila*, in company with which I have elsewhere noticed them. A Diapriid is also probably a parasite on some Dipterous insect. In the Chalcid group we may note species of the genera *Toxeuma* and *Neolelaps*, and several of *Eupelmus*. The latter are interesting from their diversity of habits, some being parasites of Coleopterous larvae, some of Chrysopides, and some of Orthopterous eggs. *Anastatus koebelei* is a common parasite in Locustid eggs, and of two other Eupelmines (one forming the rather remarkable genus *Solindenia*) the hosts are not known. An *Astichus*, and four or five other Eulophids of various groups, occur. *Polynema reduvioli* is often seen on the wing, and two other mymarids, one of which is parasitic in leaf-hopper's eggs, have also been taken.

The Ichneumons known in the locality are very few, *Evania sericea*, a cockroach parasite, has not yet been found in other countries. *Echthromorpha maculipennis* and *Pimpla hawaiiensis*, the Ophionines *Enicospilus mauicola*, *kaalae*, *dispilus*, *molokaiensis* and *dimidiatus* are all parasites of various species of Lepidoptera, *Omiodes*, *Agrotis*, *Vanessa*, and *Scotorythra* being attacked by them. One or two species of *Limnerium* are common parasites of various Pyralids and one or more species of *Atrometus* may also be found.

The two common Braconids parasitic on Longicorns of all kinds, and *Chelonus blackburni* and *Phaneretoma*, though described from the islands, are certainly all introduced, but the little apterous *Ecphylopsis* is, no doubt, endemic.

COLEOPTERA.

The native beetles of Tantalus have been a good deal collected and many species are to be found in the forest. Some of these are only found on or about this locality, or at least are much more abundant here than elsewhere. This seems to me to be partly due to the fact that the rainfall being largely precipitated

on the mountains a mile or two behind Tantalus, the climate becomes more agreeable to the Hawaiian beetles on this mountain, for it is noteworthy that in most localities with excessive precipitation the Coleopterous fauna is scanty.

The native Longicorns are not very numerous consisting of our single species of *Parandra*, *Aegosoma reflexum*, the small *Clytarlus fragilis* of the Koa, and several *Plagithmysus*. *P. solitarius* is on *Eugenia sandwichensis* and is not rare. More rarely it breeds in *Metrosiderus*. On one occasion I took eighty larvae in a small piece of wood of the "Ohia-ha," but all save two were destroyed by Braconid parasites, and the elevation being only about 1200 feet ants also were attacking the beetles. *P. pulverulentus* and *cristatus* are common on unhealthy Koa trees and as these unhealthy trees, owing to the settlement on the mountain, are now abundant, the beetles must be extremely so. *Callithmysus koebelei* in shady places on *Pipturus*, and *C. microgaster* on *Bobea* are always worth looking for. I have taken *microgaster* in May, June and November, *koebelei* chiefly in the latter month. The larvae of *microgaster* I have taken in numbers, but the beetles rarely and singly. Of the weevils the fine Otiorhynchine, *Rhyncogonus blackburni* is found sparsely on all sorts of trees, but its life history is altogether unknown. The hitherto unique *R. koebelei* was found near by, and should be rediscovered. The Cryptorhynchines are represented by *Acalles duplex* and at least three or four other species, all but the one named being most difficult to collect. I have cut some of them out of very hard and dry dead twigs and branches of different forest trees. *Dryophthorus* is well represented by *squalidus*, *distinguendus*, *gravidus*, *crassus*, *declivis*, *modestus*, *oahuensis*, *insignis and insignoides; pusillus*, the distinctness of which from *modestus* seems to me doubtful, might be rediscovered in tree-ferns, where it was found by Blackburn. The *Dryophthorus* are gregarious and it is quite usual to find from two to half a dozen species in a single flock. *Pentarthrum prolixum* is abundant on tree-ferns, and *obscurum* and *blackburni* are both to be found, the latter at very low elevations or even on the plains. *Orothreptes callithrix*, originally described from Kona, Hawaii, is not rare at 1500 feet and *Deinocossonus* is taken singly and infrequently. *Pseudolus* (two species) and *Phlocophagosoma* are in decaying Kukui, Cactus, and other soft woods, while an undescribed *Nesotocus* is very rare.

Oodemas yields three species of these brassy weevils and *Anotheorus montanus* feeds in dead wood of various trees, *Acacia*, *Aleurites*, and *Pisonia*.

The interesting *Heteramphus filicum* is found in stems of tree ferns, and no doubt the other species can be obtained on the steep sides of Manoa. Three or four species of *Xyleborus* burrow in sickly or dead trees, and probably others remain to be discovered.

In *Proterhinus*, Tantalus is very rich and it is unlikely that much, if anything, new will be obtained in this line, though it should be said that one or two are yet undescribed. Some of the species are excessively difficult to obtain, especially those that burrow in the hardest tree trunks and have to be cut out. Others are extremely abundant. Some species attack many trees even introduced ones, but others are absolutely attached to a single kind. *Proterhinus ruficornis* is local, *squamicollis* rare; *obscuricolor*, *subplanatus*, *angularis* and *archaeus* are all on *Straussia; simplex*, *obscurus* and *vestitus* on various trees, being polyphagous; *oscillans* and *vicinus* on Koa; *pusillus* on *Pelea; dispar* on *Wikstroemia; blackburni* on various trees and ferns; *deceptor* on Hau and some other trees; *longulus* on tree ferns; *oahuensis* in hard tree trunks; *oxygonias* and one or two others as yet imperfectly known. Blackburn's *P. paradoxus* and *P. oahuensis* are the rarest and most desirable species, the former not having been found since it was first collected. Two endemic Tenebrionids *Cistela crassicornis* and *apicalis* occur very rarely, and *Labetis*, a peculiar genus, two species of which were taken on Oahu by Blackburn, should turn up.

Many native Cioidae are to be found, most of them feeding on miscropic fungi in dead wood, but a few prefer the large woody growths on various trees. *Cis alienus* and *pacificus*, especially the latter, may not be really native, but the endemic species are *cognatissimus*, *tabidus*, *bicolor*, *insularis*, *porcatus*, *setarius*, *calidus*, *signatus*, *roridus*, *evanescens*, and *lacticulus*; of these *calidus*, *insularis* and *roridus* are the least numerous, but none are very rare. Two or three species of *apterocis* are found, *ephistemoides* being one of the commonest of beetles.

Anobiids are not well represented, only one or two species of *Mirosternus* and the same of *Xyletobius* and *Holcobius* being found. Their headquarters in Oahu is the Waialua end of

the range and they become scarcer and scarcer, as one comes towards Honolulu, and in no part of this island does one meet with them in the great numbers one finds on the uplands of Hawaii near Kilauea. *Holcobius glabricollis* is the most interesting species and is not rare on Koa trees. Elateridae are represented by the two endemic genera *Eopenthes* and *Itodacnus*, two species of the latter, and not less than six or eight of the former. Tantalus is probably the best known locality for these beetles, which in most places are rare or altogether absent. They are only found during the summer months, and the larvae feed in decaying wood. The beetles are often found feeding in the flowers of the Ohia, in fact are the only Coleopterous insects that visit flowers for the sake of the sweet contents of these.

About four *Eucnemidae* of the genus *Fornax* are known. The larvae are common, but unless collecting systematically one rarely comes across the mature insects.

There is a single species of the native genus *Labrocerus*, and it is not at all common and is usually found in company with the Anobiid *Xyletobius*, which it somewhat closely resembles in superficial appearance.

The Cucujids *Brontolaemus elegans* and *Laemophloeus aeneus* are both found, the former commonly, the latter very rarely. Information as to their life-history is needed, as they seem to have some connection with the various Longicorn beetles and their burrows.

The Colydiid, *Antilissus aper* is generally found under bark of *Straussia* with the two Staphylinids *Glyptoma blackburni* and *Lispinodes explicandus*.

The Nitidulidae have two or three species of *Gonioryctus* and no less than fourteen of *Brachypeplus*. *B. tinctus* and *vestitus* on flowers; *discedens*, *parallelus* and *omaloides* on *Freycinetia*; *robustus* on Lobeliaceous plants; *guttatus* on decayed and exuding Koa; *reitteri* on banana; *infimus* on *Pisonia*; *aper* on various trees, but not very common; *explanatus*, *impressus*, and *inaequalis* on several trees and climbing plants; *brevis* and a species not yet described under rubbish on the ground in shady places. The Histeridae yield two species at least of *Acletes* and one or two smaller beetles, probably *Acritus* and *Bacanius*.

The Staphylinidae have hardly been worked at on Oahu since Blackburn's time, who took many species. One or two

very minute *Oligota*, one or two *Myllaena* all rare, and an occasional *Diestota* are all I have noted. *Glyptoma blackburni* and the much rarer *Lispinodes* I have already mentioned under Colydiidae. The Staphylinidae of Oahu require a very special study extending over several years to get together a fairly good collection.

The Carabidae are well represented by one or two extremely common and some very scarce species. *Chalcomenus corruscus* may be found running in the day time on bare ground or at the bottom of gulches. It is interesting as being the first known Hawaiian Carabid. It was described in 1834 or half a century before any other species. *Colpocaccus tantalus* is very common in many situations and fifty or a hundred individuals are sometimes found in a single batch. *Mesothriscus muscicola* is not rare and *M. prognathus* probably came from the same locality. *Metromenus* has the following species; *palmae* common on *Freycinctia*; *mutabilis* in stems of tree ferns; *epicurus* abundant and very variable in colour and structure; *fraternus* rare, *fossipennis* local, *fugitivus* not rare; *protervus* very rare; *cuneipennis* rather common.

M. cuneipennis and *fugitivus* are true ground species, while the others named are found in various situations. There are also three or four other species, which have not been accurately determined at present. *Thriscothorax brevis* is not rare and is always found on the ground, and *Metrothorax simiolus* is sometimes with it, but more often found in cavities of tree ferns or rotting wood. *Bembidium teres* runs on the ground in gulches or damp places, as also does *B. pacificum*. Though abundant elsewhere in the islands, neither is common on Tantalus. Probably many other Oahuan Carabidae remain to be found in this locality and the unique *Deropristus blaptoides*, the finest of all Hawaiian Carabidae, should be looked for under stones, and the green metallic species of *Derobroscus* and *Broscomymus* in cavities in the higher branches of Koa trees.

HEMIPTERA HOMOPTERA.

Three or four species of Psyllidae are found, causing gall-like growths on the leaves of *Pelea* and *Metrosideros*. Those with pigmented wings are always rare or local species. There are some four species of Jassidae, but the Fulgorids are better repre-

sented with at least eight species of Delphacidae, four or five *Oliarus*, and a common *Iolania*. Compared with the orders already dealt with, however, the Rhynchota are very commonplace and poorly represented.

HETEROPTERA.

Lasiochilus denigratus is, so far as I remember, not abundant, and is probably the only truly endemic Anthocorid on Tantalus. *Orthotylus* of the Capsidae yields five or six species, and there are probably more. The one described *Kamehameha* is scarce but there is a second species or very distinct variety of this. *Koanoa* is sometimes common. *Nesidiorchestes* is abundant, but tedious to collect in numbers. *Pseudoclerada morai* is not common but is nearly always obtainable. *Oronomiris* is abundant on grass at all elevations. *Acanthia oahuensis* is found amongst wet leaves and on bare ground while some species of *Ploiariodes* are common and there is a *Nesidiorchestes*. Of *Reduviolus, blackburni*, *subrufus*, *rubritinctus* and *lusciosus*, the latter as defined in the Fauna Hawaiiensis, embracing at least three distinct species from Tantalus. A *Sephora*, probably *calvus*, is terrestrial and three or four *Nysius* are more or less common. Three species of *Metrarga* occur together, *M. nuda* is commonest and is both arboreal and terrestrial, *contracta* and *villosa* are generally, if not always, terrestrial, amongst decaying vegetation. I once took all three species on one day, on a certain ridge. *Oechalia grisea* is periodically abundant, *Coleotichus* less common, but not rare, and frequents ferns and Koa trees.

DIPTERA.

The Diptera have been studied least of all Hawaiian insects and no doubt many new species can be taken on Tantalus, or in any other mountain locality. The rather fine Sarcophagid flies of the genus *Prosthetochaeta* and *Dyscritomyia* occur but only one or two species of either. Somewhat resembling flesh-flies of the genus *Lucilia*, they are by far the finest Hawaiian Diptera, but in other countries would attract little attention. The small flightless Dolichopodid of the genus *Emperoptera* is locally common. Of *Pipunculus* there are at least three species, parasitic on leafhoppers. The species of *Drosophila*, of which several are known breeding in banana stems, *Pisonia* and other trees, and the

various species of *Cacnosia* are well worth collecting, as there must be many new species of these. Other still smaller and more obscure Acalypterate muscids are numerous. They should be collected in large numbers, as most of the individuals preserve badly.

ORTHOPTERA.

The little native cockroach *Phyllodromia obtusata* is extremely common, but the two very distinct species of *Brachymetopa* in the Locustidae are much more interesting. *B. blackburni* is dimorphic, having a brownish or testaceous form with black face, and a bright green form. The males are usually of the testaceous form, the females green, but occasionally a brown female or green male is found. Some of the green examples have the face largely brownish, and thus resemble *B. unica* superficially, but there are no true intermediate forms between the two phases of *blackburni*. *B. unica* is a rare species, known only as a green form, but a yellowish or brown one will probably be discovered if a number of specimens be collected. It is a most distinct species.

In the Gryllidae *Paratrigonidium* yields several species, *saltator* on *Freycinetia*, *subroseum* only on Ohia, *pacificum* terrestrial, and at least two other species, probably *varians* and *debile*. *Prognathogryllus stridulans* is the species called *Nesogryllus stridulans* in the Fauna Hawaiiensis, the curious sexual characters being formerly unknown. *Leptogryllus nigrolineatus* is found at the base of leaves of *Freycinetia*, and *fusconotatus* in exactly similar situations.

NEUROPTERA.

The Neuroptera are not well known at present; the Hemerobiids *Megalomus hospes* and *Nesomicromus vagus* are common and one other species, probably *subochraceus*. *Anomalochrysa deceptor*, *biseriata*, *proteus*, and *cognata* have been taken, and there are certainly others.

Stray specimens of the dragon-fly *Sympetrum blackburni* are occasionally seen, and of the great *Anax strenuus*, and the following Agrionines *A. xanthomelas*, *hawaiiense?*, *nigro-hamatum*, *deceptor*, and *occanicum*. All these are stragglers from neighboring waters, but I noticed three of the five in one spot the other day. *A. asteliae*, *A. koelense*, and *A. oahuense* all breed at

the bases of leaves of *Freycinetia* and other plants, the larvae being arboreal and not living in water, and they occur regularly on Tantalus, *koelense* being very common. *Psocidae* are very common and several native species are present, but many recently introduced forms have now occupied this mountain, and the native ones are more agreeably studied in more remote localities.

The above lists though no doubt very imperfect, are sufficiently extensive to show that a fine field for work is close at hand for those who have any ambition to study the peculiar fauna of Hawaii. The best localities are within an hour and a half's walk of our meeting place here. I would rather advise the thorough study of some of the more interesting of the insects already known, than the usual hunt after new species, the acquisition of which will probably be of comparatively little importance. To know the life-history of *Rhyncogonus blackburni* and why it remains so comparatively weak in individuals; or to fully ascertain the life-history of some of the Carabids, and why again some are so common, others so extremely rare; what furnishes food for the larvae of such common species as *Metromenus epicurus* or *Colpocaccus tantalus* would be far more interesting than the discovery of half a dozen new *Proterhinus*, which would surely differ but little from species already known. However, looked at even from the view of acquiring *new species* he would be a bold man, who would say that there are not many such to be obtained on Mount Tantalus.

MARCH 1st, 1906.

The fourteenth meeting was presided over by Mr. Kirkaldy.

Notes and Exhibitions.

Dr. Cobb, in examining sugar-cane affected with the "iliau" disease, had observed a Lepidopterous larva in numbers constantly present where the disease existed. The latter being saprophytic he was inclined to suspect that some relation existed between these caterpillars and the disease. At the Hutchison Plantation he had observed another sugar-cane disease associated with Lepidopterous Larvae. On one plantation on Hawaii he had observed earwigs in the cane in great abundance, while in Hilo

he had observed *Xiphidium varipenne* in considerable numbers, having counted as many as thirty or forty on the ceiling of his room.

Mr. Swezey stated that since writing on *X. varipenne*, he had observed this species partaking of more vegetable food than he had formerly supposed. He had seen it eating the flowers of *Lantana* quite extensively, showing a decided taste for the immature stamens; he had also seen it devouring the flowers of the wild *Canna*, as well as a sugar-cane leaf, at the Experiment Station.

Papers.

The Chairman read a paper by Mr. R. C. L. Perkins, entitled: **"A New Method of Relaxing and Cleaning Specimens,"** and exhibited examples.

Anyone who has had an extensive experience in relaxing and mounting dried specimens of insects, must have come across specimens so difficult to deal with, after the usual methods of relaxing have been tried on them, as to be almost impossible to mount in proper style. Anyone of ordinary powers of observation must have noticed that relaxation is greatly facilitated by the use of napthaline in the relaxing jar. Further, it is obvious that that most valuable, in fact indispensable, preservative of insects, carbolic acid, tends to make specimens more difficult to relax, by inducing a wire-like condition of the limbs.

At various times Dr. Sharp and myself came across specimens, amongst my Hawaiian collections, in this condition, and we were forced to be content to simply pin up such specimens without expanding the limbs, antennae, etc. Lately I discovered a misplaced box of Tantalus beetles, collected in 1902 and not seen since, all of which had become covered with a dense growth of mould, and were in an apparently hopeless condition. Wishing to clean them, at least sufficiently for a determination of the species, I tried various methods without any great results, till I finally hit upon the following method. In a tumbler of nearly boiling water place a piece of soap as large as a large pea, and a small spoonful of pure napthaline, stir till the soap is sufficiently dissolved to make the water at least milky. While the water is still very hot—too hot for one to keep one's hand on the glass—put in the mouldy or stubborn beetles and cover the top of the

glass. The time required for relaxation varies with the nature of the beetle and its condition.

A *Rhyncogonus blackburni*, which after a day or two in the usual relaxing jar it was impossible to mount properly, was in perfect condition for mounting in thirty minutes. This was a 1902 specimen.

A large Cossonid *Nesotocus munroi*, a species which is most apt to assume a most wiry condition, and was one of the worst samples of this condition I have ever seen, was mounted after one hour's immersion, but less easily than the *Rhyncogonus*. This specimen, however, was nine or ten years old, had been collected in alcohol, then simply pinned with all the legs folded up, and entangled; and subjected to the fumes of carbolic in a store box for at least eight years. As to the mouldy specimens the treatment was first given to some moderate-sized Carabids. Every particle of mould brushed off with ease, and relaxation was complete in thirty minutes. I then tried smaller species, *Bembidium*, with similar results. The surface of the Carabidae being smooth, I then took mouldy specimens of the little beetle *Antilissus aper*, a species very easily injured. The results were similar, the mould was removed in spite of the rough surface, the sculpture and setae showing again in the most perfect manner. The most obstinate and dirty specimens of *Dryophthorus* and *Oodemas* were cleaned to a degree that exhibited the clothing or sculpture in a way never seen in specimens taken at large. I exhibit one or two species of beetles relaxed and cleaned by the above method, not as samples of absolutely accurate mounting, but as showing what can be done with apparently hopeless specimens.

Mr. O. H. Swezey read **"Life History Notes and Observations on Three Common Moths,"** and exhibited specimens.

(1) Plusia chalcites, Esp.

This common moth of the Hawaiian Islands, occurs also in other Pacific Islands, Australia, Southern Asia, Africa, and Southern Europe.

Life History.—The eggs are white, about one-half mm. in diameter, flattened, height about half the diameter, entire surface covered with concavities like those on a thimble arranged in

regular rows radiating from the apex. They are deposited singly on the under surface of leaves. I observed a female ovipositing, one evening just before it was too dark to see the eggs. She was fluttering around some bean vines, and would occasionally alight but an instant on the edge of a leaf, bending her abdomen beneath to place the egg on the under surface; then she would fly about a few moments and go to another leaf. I watched her several minutes, and she oviposited at the rate of about two eggs per minute.

Some of the eggs hatched in six days. The freshly hatched larvae are 2 mm. long, green with black hairs situated in small black tubercles. At first they ate small patches of the substance of the leaf, leaving the opposite epidermis; but when five days old they ate small holes entirely thru the leaf. Larger caterpillars ate larger holes, and ate the leaves from the margin as well.

There is very little change in the larva at the successive molts, except in size. The full-grown larva is about 36 mm. long; bright green, with a white line just above the line of spiracles, and several faint, crinkly, white lines down the back, often a black spiracular line; tubercles mostly white, except a row just above the spiracles which are black and larger than the others. (Usually all tubercles were black previous to the last molt). Feet often black; head green, with black dots where the hairs are situated, and a black line on lateral margins; mandibles blackish on tip and edges. The prolegs are situated on segments 9, 10 and 13, and the caterpillar crawls by a looping motion; when at rest, its back is humped up.

A caterpillar in breeding cage obtained its growth and ready to pupate in twenty-three days. The pupa is pale green with a broad brown streak on the back, darker on the margins of the segments, the whole pupa turning brownish a little before the adult emerges; wing and leg-cases extend just a little beyond the posterior margin of the fourth abdominal segment; cremaster short, with several tiny brown hooks attaching the pupa to the slight white silken cocoon, which is made between leaves fastened together, or in the fold of a single leaf; length of pupa 19 mm., width 4.5 mm. The pupal period is eight to eleven days.

Food plants.—Caterpillars of this species are quite general feeders. I have found them feeding upon the following plants:

Adenostemma viscosum, *Ageratum conyzoides*, bean, beet, cabbage, *Canna*, cockle burr, *Coleus*, cotton, *Datura*, *Euxolus*, *Ipomoea*, *Pelargonium*, potato (both Irish and sweet), *Setaria verticillata*, *Sonchus*, sunflower, tomato, wild yam, and a few other undetermined wild plants.

(2) **Spodoptera exigua** (Hübner).

This moth was first recorded from the Hawaiian Islands by Butler (1880) who described it as *Caradrina venosa*. His description was from specimens collected near Honolulu, by Blackburn, who said it was "rare." "Macrolepidoptera," of the Fauna Hawaiiensis, gives Kona, Hawaii, and Lahaina, Maui, as places where it had been collected.

It is a widely distributed moth, being recorded from Great Britain, Southern Europe, Africa, Southern Asia, China, Japan, Australia, Hawaiian Islands, and Western United States. In the latter country it has been reported from Oregon, California, Colorado and New Mexico, where it is known as the Beet Army Worm (*Caradrina* (*Laphygma*) *exigua* Hbn.)

A very complete account of its depredations, habits, life history, etc., together with figures, is given in Bul. U. S. Div. Ent. 33 n. s., pp. 37–46, 1902.

It is not nearly so common on these Islands as *Spodoptera mauritia*. I have found it on only two occasions. The first was at Pahala, Hawaii, Dec. 5, 1905. A large number of larvae of all sizes were found feeding on Castor Oil plants (*Ricinus communis*), in a small gulch in a sugar cane field of the plantation of the Hawaiian Agricultural Co. Several egg clusters were also found, which on hatching proved to be this same species.

The egg clusters were on the upper surface of a leaf. In one cluster, 40 eggs were counted. They were spherical, in regular rows, one layer deep, and the cluster densely covered with greyish hairs from the body of the moth.

One cluster of 100 was found which had just hatched. The larvae were two mm. long, green with black heads, and finely pubescent, each hair in a tiny black tubercle.

While young they fed gregariously on the upper surface of a leaf along a vein where the leaf was somewhat depressed, and they ate only the green substance of the leaf, leaving the lower epidermis. They were covered by a slight web. As they increase in size they become more separated, often feeding

singly, but protected by a web, tho not always. Finally, when about full grown, they were found without the protecting web; and they ate the leaf entirely, making ragged holes, not leaving the lower epidermis.

The ground color of the upper surface of a larva 12 mm. long is black, with fine longitudinal, crinkly, much interrupted lines of yellowish; there are three nearly complete yellow lines on dorsal side, the middle one forking on the head; a broad yellowish line just below the level of the spiracles; there is a row of white dots on each side, one dot behind and a little above each abdominal spiracle; under side paler than upper.

A larva somewhat larger had the same markings except that the yellowish lines have become greenish. As they become older there is quite a variation in the degree of coloration, often the green predominates, and an occasional specimen is almost entirely black, but all have a black line on the level of the spiracles; the mid-dorsal pale line is nearly obliterated; spiracles are brownish, with black borders. Some of the larger caterpillars were collected to rear to maturity, which determined the species.

On Dec. 30, 1905, a cluster of eggs was found on *Euxolus* sp. (one of the Amarantaceae) in a weed patch in Honolulu. These eggs hatched Jan. 1, 1906, and were fed until full grown upon leaves of Euxolus. Four larva were full grown and ready to pupate, in sixteen days; length 25 mm. They entered the ground to pupate.

The pupa is 12 mm. long; medium brown, with some greenish on wing and leg-cases; smooth, except a punctate band on anterior margin of segments 4, 5, 6, 7 of abdomen; abdominal spiracles black, very slightly raised; cremaster two sharp-pointed spines.

The pupal period was twelve to seventeen days.

I have not found this species feeding on any other plant than *Ricinus*, and *Euxolus;* but Meyrick gives *Plantago* as its food plant; and in Western United States it is considered a pest on the sugar beet, tho it is quite a general feeder, having been reported on table beets, lambsquarters, pigweed, saltbush, Russian thistle (all closely related plants) and when numerous feed also on corn, potato, pea, onion, wild sunflower, leaves of apple, mallow, *Nicotina glauca, Cleome*, and wild grasses.

(3) **Spodoptera mauritia** Boisd.

This moth occurs commonly in these islands, in fact at one time was a serious pest. Mr. Perkins says that their numbers were greatly reduced after the introduction of the Mynah birds, these birds feeding largely upon the caterpillars. The species occurs also in Mauritius, West Africa, Southern Asia, and thruout Oriental and Australian regions.

The caterpillars feed upon grasses, and I have found them on young sweet corn and peas, also on a sedge (*Cyperus rotundus*), commonly called "bulb grass" or "nut grass," which is a troublesome weed in lawns and gardens. At the Experiment Station of the Hawaiian Sugar Planter's Association, they were found feeding on very young sugar cane seedlings during January and February, 1906. They were first discovered on January 3d, when a few of the tiny green larvae were found on very small cane seedlings in propogating boxes. A few of these larvae were found each day for several days thereafter; on one day (Jan. 10), twenty-five were found. Although very small, the cane plants were also very small (one to two inches in height), and if a larva had fed for two or three days upon a plant before discovery, the plant was nearly destroyed; so that quite a little trouble and some loss was caused by these caterpillars during the months mentioned. Usually not more than one caterpillar would be found on a plant, but occasionally as many as four were found. Being green, and so small, they were most easily detected by first seeing the partially dead leaf where they had eaten, as they began near the apex of the leaf and continued downwards, eating the mesophyll and leaving the opposite epidermis. On being disturbed they dropped to the ground by a fine silken fiber, and curled up. Several of the caterpillars were reared to maturity.

Life History.—The eggs of this moth are spherical, vertically striated, and laid in clusters on the surface of some object. They are usually in one layer and in regular rows, and covered by a few hairs from the body of the moth; 100 to 300 eggs per cluster. I have found them on leaves of banana and oleander at a distance of five feet from the ground. At the H. S. P. A. Experiment Station a large number of egg clusters have been observed on the outside of the insectaries, one as high as ten feet from the ground. A hatched cluster was found in a shed where the boxes of cane

seedlings before mentioned were placed at nighttimes. It was in such a position that the young larvae might drop onto the cane seedlings below, as it is their habit on hatching to drop to the ground by a silken thread. This probably accounts for the cane seedlings having been infested, as the small caterpillars were scattered quite generally amongst the propogating boxes; whereas, if a cluster of eggs had been deposited on any one box, the larvae would not for some time have been likely to get to other boxes, but would all have attacked the cane plants in that one box.

When larvae are a few days old, they consume the entire substance of the leaf, not leaving the epidermis as they did at first. They obtained their growth in about twenty-one days, and were about 35 mm. long. From being green at first, in successive molts, they became darker, often almost entirely black They entered the ground to pupate. The pupa is similar to that of *S. exigua*, but slightly larger, and the spiracles a little more raised. The pupal period is eleven to fourteen days.

Dyar has described all of the preparatory stages of this moth (Can. Ent. XXVI, p. 65, 1894) under the name *Laphygma flavimaculata*. A correction of the name is made in Can. Ent. XXXII, p. 156, 1900. This is a very complete description, but the spiracles of the caterpillar are black, instead of white as he describes them. He has evidently mistaken for spiracles a row of white dots behind and a little above the spiracles on segments 5 to 12.

Mr. F. W. Terry discussed the **"Increase of the Antennal Segments in the Forficulids Chelisoches morio (Fabricius) and Forficula auricularia Linnaeus,"** and exhibited specimens.

Whilst studying the life-history of *Chelisoches morio**, I made some observations on the numerical increase of the antennal segments. It was found that there was a definite increment at each ecdysis, the extra segments always appearing to arise from subdivisions of the third segment. Since the publication of these observations, my attention has been called to a paper by Meinert† on the life-history of *Forficula auricularia*. This author appears somewhat vague in his observations; he states

* Bull. Hawaiian Plant. Ent. 165-6 1905.

† Naturh. Tidsskr. (3) II, 427-82 Pl. IX (1864).

that the larva upon emergence from the egg has "six or eight" antennal segments, this number being increased by two at each moult, and that the adult possesses fourteen segments. As regards the number of moults, he is also uncertain, stating that there are "three or four." Now, although possible, it is improbable that the number of ecdyses should normally vary in these two types. We know that the number of moults in *Chelisoches* is four, and that the increase of the antennal segments at each successive moult is as follows: four (1st moult), four (2d moult), three (3d moult), one (4th moult). Assuming that there are four ecdyses in *Forficula*, and that the somewhat fragmentary data of Meinert are correct, we obtain the following comparison:

NUMBER OF ANTENNAL SEGMENTS.

	1st instar	2nd instar	3rd instar	4th instar	5th instar
Chelisoches	8	12	16	19	20
Forficula	6	8	10	12	14

Whether the above problematic increase is correct for *Forficula auricularia* requires to be verified, and it will be of interest if some entomologist having access to this common species will investigate this question.

Mr. J. Kotinsky read notes on a **"Hymenopterous Parasite of an Orthopterous Egg,"** and exhibited specimens.

Last October I collected up Nuuanu Valley a leaf which contained an Orthopterous egg from which in November issued *Anastatus koebelei* Ashmead, as determined by Mr. Perkins. This month I received a collection of eggs that seem to be a similar, if not the same, species, from Hilo, Hawaii, on coffee leaves, collected by Bro. Matthias Newell. From these I bred a large number of a small black Chalcidoid parasite, which, judging from its size, seems to be secondary.

The host has since been partially reared and found to be *Elimaea appendiculata*, which Mr. Perkins states, habitually oviposits in young shoots of trees like the Avocado Pear.

In the discussion on the above four papers, Mr. Kotinsky had observed *Plusia chalcites* ovipositing on violets on Tantalus; while Mr. Giffard had seen it ovipositing on *Salvia* at the same place. Referring to Mr. Terry's notes, Mr. Kotinsky observed that in *Dactylopius* there is frequently a variation in the number of antennal segments, one species having either seven or eight, and it has been noted that the additional segment is usually formed by the division of the third.

APRIL 5th, 1906.

The fifteenth regular meeting was presided over by Mr. Kirkaldy.

Member elected: Mr. W. E. Chambers.

Amendment to Constitution: After due notice given at the previous meeting, Mr. Kirkaldy moved that Article VI of the Constitution be amended to read "The annual meeting for the election of officers shall be the regular meeting for the month of December," instead of "January," as it reads at present. The motion was seconded by Mr. Van Dine and carried.

Notes and Exhibition of Specimens.

Mr. Kotinsky exhibited thirty-two specimens of *Dacus cucurbitae* bred from a tomato, collected in the city; this was the first record of this pest on tomatoes, although it has been previously spoken of as occurring on this fruit. He had ascertained from Mr. Maxwell-Lefroy, Government Entomologist of India, that the fly occurs in India and is there kept in check by parasites. Mr. Weinrich said that tomatoes and melons were being attacked at Sisal by this fly. Mr. Van Dine stated that over-irrigation makes the plants subject to attack by this fly more succulent and therefore, more vulnerable; artificial pollination and immediate covering of the fertilized flowers are means resorted to on these Islands for securing cucurbitaceous fruit.

Papers.

The following paper was read by the Chairman:

Notes on Hawaiian Wasps, With Descriptions of New Species.

By R. C. L. Perkins.

(abstract)

This paper dealt with the habits, economic importance, parasites and especially with the colouration of the Hawaiian *Odynerus*. It was shown that the many species formed a number of very distinct and definite colour groups and that all the phenomena of the so-called "inedible associations" were presented by them. The causes supposed to give rise to these "inedible associations" were, however, absent in the Hawaiian Islands. Three synoptic tables were furnished, one dealing with the species frequenting Oahu, being a revision of the table published in the *Entomologist's Monthly Magazine* ("Notes on Hawaiian Aculeate Hymenoptera," (2) XII, pp. 264–8, Nov., 1901); a second deals with the species of Maui, Molokai and Lanai; and a third with those of Kauai. The species of Hawaii were published in the "Transactions of the Entomological Society of London" (1902, pp. 131–40; "Notes on Hawaiian Wasps, with Descriptions of New Species"). Several new species were described and some previously named in the dichotomous table of Oahuan species, above mentioned, were now more fully described.

(i) SYNOPSIS OF OAHUAN ODYNERUS.

1 (4) Dorsal and posterior faces of the post-scutellum sharply defined by a serrulate or spinulose ridge (easily seen from in front);

2 (3) Costae of second ventral segment more or less obsolete. *Odynerus nigripennis.*

3 (2) Costae of second ventral segment well developed. *O. epipseustes.*

4 (1) Dorsal and posterior faces of the post-scutellum not divided by a serrulate or spinulose ridge.

5 (10) Intermediate tibiae without a true calcar, at most with some very short spines at the apex. *Nesodynerus.*

6 (7) Second ventral segment with a shallow but evident triangular impression behind the costae. *N. optabilis.*

7 (6) Second ventral segment without such an impression.

8 (9) Wings with brilliant purple or blue iridescence. *N. rudolphi.*

9 (8) Wings fuscous without such iridescence. *N. oblitus.*

10 (5) Intermediate tibiae with a distinct calcar.
11 (28) Thorax or abdomen or both with red markings.
12 (13) Basal abdominal segment entirely red above, or at most a little infuscate, second also largely red as also the tegulae. *Odynerus frater.*
13 (12) Basal abdominal segment black with a red hind-margin.
14 (15) Prothorax and mesopleura without red spots (female). *O. paludicola.*
15 (14) Prothorax and mesopleura marked with red.
16 (21) Second ventral segment very strongly and abruptly raised behind the transverse sulcature to a height much greater than that of the basal part of the segment.
17 (20) Red colour of pronotum extended back along its margin to reach the tegulae.
18 (19) Second ventral segment very strongly raised from the costae; clypeus of male red at base; mesonotum of female more finely and irregularly punctured. *O. leiodemas.*
19 (18) Second ventral segment still more strongly raised from the sulcature; clypeus of the male not red at the base; mesonotum of female more strongly and evenly punctured. *O. pseudochromoides*, sp. nov.
20 (17) Red markings of pronotum not extended back along the margin to touch the tegulae. *O. pseudochromus.*
21 (16) Second ventral segment not very greatly and abruptly raised behind the costae; at most it is raised to a height about equal to the basal part of the segment in front of the costae.
22 (23) Mesonotum with irregular puncturation, consisting of sparse larger punctures (which are themselves not at all coarse) and finer interstitial punctures; wings shining fuscous. *O. paranaias*, sp. nov.
23 (22) Mesonotum with very dense and uniform puncturation, or if the punctures are not so dense they are deep and coarse. Wings to a large extent subhyaline.
24 (27) Propodeum rugose or rugosely punctate.
25 (26) Mesonotum with red lines. *O. homoeophanes.*
26 (25) Mesonotum black. *O. eucharis.*
27 (24) Propodeum smooth, with some shallow punctures. *O. oahuensis.*
28 (11) Thorax and abdomen without red markings, rarely with the apical margins of one or more abdominal segments very narrowly and indistinctly testaceous.
29 (44) One or more entire yellow or whitish bands on the abdomen (thorax also often with yellow markings).
30 (31) Mandibles in both sexes entirely or almost entirely red (male with the clypeus very deeply emarginate at the apex, that of the female distinctly but less deeply). *O. xerophilus.*
31 (30) Mandibles at most red or piceous on the apical half; generally for the most part black.

32 (35) Second ventral segment behind the costae with a distinct impression, which is wide and shallow, or of moderate width and depth and of triangular shape (clypeus of male deeply or rather deeply emarginate).

33 (34) Male with the scape entirely yellow in front; female with a yellow spot on each side of the propodeum near the insertion of the abdomen. *O. nautarum.*

34 (33) Male with the scape black, female with the propodeum without yellow markings. *O. erro*, var.

35 (32) Second ventral segment behind the costae generally flattened but without a triangular depression; when there is a depression it is very narrow, linear or sublinear (clypeus of male never deeply emarginate, but sometimes an apical impression gives it the appearance of having a deeper emargination than really exists.

36 (37) Second ventral segment of abdomen abruptly, but not greatly raised from the apices of the costae, depression feeble and linear for the most part; wings shining fuscous without blue iridescence. *O. waianaeanus.*

37 (36) Second ventral segment flattish or slightly convex behind the costae, never abruptly raised from their apices, wings frequently with blue iridescence.

38 (39) Costae of second ventral segment very short, shorter than the tumid basal part of the segment anterior to them. *O. acoelogaster.*

39 (38) Costae of second ventral segment not very short, the middle ones generally long and not shorter than the basal division of the segment.

40 (41) Wings shining fuscous, without distinct blue iridescence, clypeus and thorax entirely black (female unknown). *O. acyanus.*

41 (40) Wings dark, with more or less evident blue or steely iridescence clypeus of male nearly always and thorax often yellow-marked.

42 (43) Maxillary palpi of female very long and fringed with long hairs; male with the front of head rather remotely punctured, maxillary palpi more developed. *Pseudopterocheilus relictus.*

43 (42) Maxillary palpi of female normal; head closely punctate in front in the male and the palpi less developed. *Odynerus lithophilus.*

44 (29) Abdomen not yellow-banded, rarely with the margins of some of the segments faintly and inconspicuously testaceous; thorax not yellow-marked.

45 (54) Wings dark, with distinct blue or purple iridescence.

46 (51) Propodeum rugose or rugosely punctured; second ventral segment with a wide shallow depression, and all the costae well developed.

47 (48) Second dorsal segment hardly visibly punctured. *O. iopteryx.*
48 (47) Second segment with shallow, but conspicuous, puncturation.
49 (50) Mesonotum very dull, scutellum with sparse and very feeble punctures. *O. illudens.*
50 (49) Mesonotum not extremely dull, scutellum very distinctly, generally rather deeply, though remotely, punctured. *O. montanus.*
51 (46) Propodeum smooth or only with feeble impressions or punctures; costae of second ventral segment sometimes more or less effaced or indistinct, at least the middle ones.
52 (53) Mesonotum subrugosely punctured, the punctures of two sizes but the smaller ones conspicuous; second segment beneath with a conspicuous triangular depression. *O. erro.*
53 (52) Mesonotum with fine sparse puncturation; second ventral segment with a narrow and shallow depression, the costae usually more or less effaced at least in the middle of the series. *O. unicus.*
54 (45) Wings shining fuscous without blue or steely iridescence.
55 (56) Large species (about 10 mm. to apex of second abdominal segment,) mesonotum subrugosely punctate, the smaller punctures being unusually developed in size as compared with the larger, the latter fine and the whole tending to run into one another. *O. paranaias.*
56 (55) Small species, less than the above in length; mesonotum without the sculpture described above.
57 (58) Second dorsal segment in dorsal aspect raised into a conico-tuberculate form at about one-fourth of its length from the base. *O. pterophaennes.*
58 (57) Second dorsal segment only convex, not conico-tuberculate.
59 (60) Depression of second ventral segment wider and shallower; female with the scutellum much more feebly punctured than the mesonotum. *O. dubiosus.*
60 (59) Depression of second ventral segment narrower and deeper; female with the punctures of the scutellum not much finer and feebler than those of the mesonotum. *O. threnodes*

(ii) SYNOPSIS OF ODYNERUS OF MAUI, MOLOKAI AND LANAI.

1 (2) Post-scutellum with a distinct raised serrulate or spinulose ridge dividing the dorsal and posterior surfaces; second discoidal cell about twice as high at the apex as the third is at the base. *O. nigripennis*, Holmgr.
2 (1) Post-scutellum without such a ridge; second discoidal cell generally much less than twice as high at the apex as the third is at the base.
3 (30) Abdomen with red-markings, sometimes only the hind margin of the basal segment with a red band, entire or broken; if the abdomen has no red markings, then *the mesopleura have a red spot.*

4 (5) First and second abdominal segments for the most part red, second sometimes black or fuscous at base and apex but red on the disc. *O. frater*, D. T.

5 (4) First and second abdominal segments not for the most part red, if the first is red then the second is always black on the disc.

6 (7) Second ventral segment extremely strongly and abruptly raised behind the transverse sulcature to a height much greater than that of the basal part of the segment, the sulcature smooth and without costae. *O. homoeogaster*, P.

7 (6) Second ventral segment not very greatly raised, if moderately raised then the costae are present and the sulcature is not smooth and shining.

8 (13) Clypeus of the male extremely strongly emarginate, the emargination hardly less than semi-circular or even stronger; female with the clypeus strongly and distinctly emarginate, but sometimes much less deeply than that of the male.

9 (12) Basal abdominal segment for the most part red; second ventral segment with a shallow, or very shallow and vague, depression beyond the costae.

10 (11) Smaller, length to apex of second abdominal segment less than nine mm.; no median yellow frontal spot; punctures of basal abdominal segment effaced over almost the whole surface. *O. monas*, sp. nov.

11 (10) Larger, length to apex of second segment not less than nine mm. head with a median yellow spot; puncturation of basal abdominal segment shallow, but conspicuous. *O. cephalostictus*, P.

12 (9) Basal abdominal segment with a red apical band dilated at the sides; second ventral segment with a deep and distinct depression. *O. naiadum*, P.

13 (8) Male clypeus not extremely deeply emarginate; in the female the true emargination slight, or the apex is truncate.

14 (15) Clypeus distinctly red-marked on the basal half; (pronotum and apical margin of first abdominal segment always red-marked, second segment entirely black and the mandibles mostly dark. *O. tempe*, sp. nov.

15 (14) Clypeus not marked with red on the basal part; (pronotum in some species entirely black, second segment in many species red-marked, mandibles sometimes red).

16 (27) Prothorax with red-markings.

17 (22) Propodeum always red or red-marked.

18 (21) Apical margin of the second abdominal segment red.

19 (20) Basal abdominal segment with an apical red band strongly dilated at the sides; mesothorax somewhat finely and irregularly punctured. *O. dryas*, P.

20 (19) Basal segment nearly entirely red; mesothoracic punctures coarse. *O. potamophilus*, P.

21 (18) Apical margin of second segment not red.

21a(21b) Basal abdominal segment nearly entirely red.
O. microdemas P.

21b(21a) Basal abdominal segment with an apical red band, sometimes interrupted. *O. monobius* var.

22 (17) Propodeum black.

23 (24) Propodeum rugose. *O. erythrostactes* P.

24 (23) Propodeum smooth or punctured.

25 (26) Propodeum smooth, impunctate or nearly so. *O. montivagus* P.

26 (25) Propodeum densely punctured in the concavity.
O. monobius P.

27 (16) Prothorax not red-marked.

28 (29) Second abdominal segment with a red apical band.
O. sandwichensis, de S. (*O. rubritinctus*, Sm)

29 (28) Second segment without a red apical band. *O. petrobius*, P.

30 (3) Abdomen without red markings, and the *mesopleura without a red spot* beneath the tegulae.

31 (40) Costae of second ventral segment of abdomen largely effaced and indistinct, or altogether wanting, the transverse sulcature often smooth and shining, the abdomen never with two yellow bands.

32 (33) A median red frontal spot on the face, and the prothorax always red-marked, second segment of abdomen above simple, not at all strongly convex or raised from the base, beneath greatly and abruptly raised behind the sulcature.
O. deinogaster, P.

33 (32) No red frontal spot on face, the prothorax at most indistinctly reddish along the hind margin, second segment above always more or less strongly raised from the base or strongly convex in profile; beneath of various forms.

34 (37) Second ventral segment raised from the sulcature to a height very much greater than that of its basal portion.

35 (36) Propodeum smooth, shining; apex of clypeus red
O. purpurifer, P.

36 (35) Propodeum not smooth and shining, but punctate or subrugose apex of clypeus not red. *O. instabilis*, P.

37 (34) Second ventral segment of abdomen (seen in profile) raised behind the sulcature only to about the height of its basal portion or a little higher.

38 (39) Second ventral segment with a rather wide depression behind the sulcature. *O. ecostatus*, P.

39 (38) Second ventral segment with a narrow depression.
O. laevisulcatus, P.

40 (31) Transverse sulcature of second ventral segment with distinct costae, never smooth and shining; if the costae are more or less obsolete the abdomen has two yellow bands.

41 (42) A median frontal spot and the tegulae always, other markings sometimes red. *O. camelinus*, P.

42 (41) Frontal spot and tegulae not red.

43 (46) Apical margins of two basal abdominal segments yellow or whitish *and* either the clypeus is only lightly emarginate, or if rather strongly then the second segment of the abdomen is somewhat strongly and abruptly raised from the base; in the male at least into a conical tuberculate form.

44 (45) Second segment of abdomen above simple, beneath not abruptly raised from the apices of the costae.
O. nubicola, P.

45 (44) Second segment above raised from the base; beneath abruptly elevated from the apices of the costae. *O. nivicola*, P.

46 (43) Abdomen often black or with one yellow band, if with two bands then the clypeus is deeply or very deeply emarginate and the second dorsal segment of the abdomen is simply convex, never abruptly raised from the base into a subtuberculate conical form.

47 (52) Second ventral segment flat or nearly so behind the costae and without any depression, the basal part tumid and either the costae are extremely short compared with the basal part, or the apex of the clypeus and mandibles are both red.

48 (49) Apex of clypeus and mandibles both red. *O. cupteryx*, P.

49 (48) Apex of clypeus not red.

50 (51) Propodeum shining. *O. brevicostatus*, P.*

51 (50) Propodeum dull (middle tibiae without a calcar).
Nesodynerus paractias, sp. nov.

52 (47) Second ventral segment in most species with a more or less distinct depression behind the costae, which are never excessively short, nor is the basal part very largely developed and tumid, nor is the apex of the clypeus ever red.

53 (70) Males; antennae thirteen-jointed, terminal joints modified into a hook.

54 (61) Apex of clypeus rather deeply or very deeply emarginate, in the first case yellow or yellow-spotted.

55 (56) Mesothoracic puncturation nearly or entirely effaced.
O. sociabilis, P.

56 (55) Mesothoracic punctures always distinct, if shallow.

57 (60) Clypeus extremely deeply emarginate, the emargination not less than a semi-circle.

58 (59) Mandibles red. *O. molokaiensis*, P.

59 (58) Mandibles dark. *O. smithii*, D. T.

60 (57) Emargination of apex of clypeus less than a semi-circle (head above the antennae with somewhat remote puncturation).
O. insulicola, Bl.

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* It is very probable that *O. brevicostatus* and possible that *O. cupteryx* belong to the genus *Nesodynerus*, the unique types of these species in the British Museum not having been examined for the essential generic character.

61 (54) Clypeus generally more or less impressed at the apex but the true emargination not deep.

62 (63) Mandibles for the most part red; propodeum with dull surface and hardly visible sculpture. *O. aprepes*, sp. nov.

63 (62) Mandibles generally for the most part black; propodeum with some coarse shallow punctures or rugose.

64 (67) Head above the antennae densely, mesothorax strongly and closely, punctured.

65 (66) Second ventral segment of abdomen with no depression behind the costae or with only faint traces of one. *O. lanaiensis*, P.

66 (65) Second ventral segment with a shallow but distinct depression (second dorsal segment quite strongly subtuberculately raised from the base). *O. konanus.*, P

67 (64) Head above the antennae more or less remotely or sparsely punctured, mesothorax not strongly punctured.

68 (69) Clypeus wide, seen from in front not much produced; face with a median yellow spot. *Pseudopterocheilus congruus*, Sm.

69 (68) Clypeus long and narrow much produced; no yellow frontal spot. *Chelodynerus chelifer*, P.

70 (53) Females; antennae twelve-jointed, simple at the apex.

71 (72) Mandibles extremely long and narrow with the teeth more or less obsolete; a distinct and rather long cheek between the eye and mandibles. *C. chelifer*, P.

72 (71) Mandibles normal; no distinct cheeks.

73 (74) Maxillary palpi extremely long and regularly fringed with long hairs. *P. congruus*, Sm.

74 (75) Maxillary palpi normal.

75 (76) Mesothorax with fine sparse punctures, sometimes almost effaced, the surface very dull with extremely dense minute interstitial punctures very distinct. *O. sociabilis*, P.

76 (75) Mesothorax always distinctly, sometimes strongly or densely punctured, the surface between the punctures in some species more or less shining, the minute interstitial punctures in some indistinct or nearly effaced.

77 (78) Mandibles nearly entirely red. *O. molokaiensis*, P.

78 (77) Mandibles wholly or for the most part black.

79 (84) Mesothorax closely and often strongly punctured.

80 (83) Apex of clypeus truncate or very slightly emarginate, basal abdominal segments not pale along the apical margins.

81 (82) Depression of second ventral segment of abdomen shallow but quite distinct. *O. konanus*, P.

82 (81) Depression of second ventral segment scarcely or not at all perceptible. *O. lanaiensis*, P.

83 (80) Apex of clypeus very distinctly emarginate, the true emargination not very feeble; abdomen generally with the apical margin of the basal or two basal abdominal segments pale. *O. smithii*, D. T.

84 (79) Mesothorax somewhat remotely and not strongly punctured. *O. insulicola*, Bl.

(iii) SYNOPSIS OF KAUAI ODYNERUS.

1 (6) Dorsal and posterior faces of the post-scutellum separated by a fine spinulose or serrulate ridge or raised line.

2 (3) Abdomen entirely black, or very rarely with the apical margin of the basal segment yellow. *Odynerus nigripennis.*

3 (2) Abdomen with two distinct yellow or whitish bands.

4 (5) Basal abdominal segment completely rounded off at the meeting of its dorsal and anterior surfaces. *O. radula.*

5 (4) Basal abdominal segment slightly depressed on its dorsal surface, so that this forms with the anterior surface a rather distinct edge, where they meet. *O. localis.*

6 (1) Dorsal and posterior faces of the post-scutellum not separated by a distinct raised line

7 (10) Thorax and abdomen with red markings.

8 (9) Pronotum with a fine transverse red line, entire or broken. *O. soror.*

9 (8) Pronotum without a red line. *O. blackburni.*

10 (7) Thorax and abdomen without red markings.

11 (12) Abdomen with the bands orange or deep yellow. *O. xanthorhoes.*

12 (11) Abdomen with pale yellow or whitish bands.

13 (14) Second ventral segment very strongly and abruptly raised behind the sulcature, to a height much exceeding that of the basal part of the segment (the costae more or less obliterated, and no depression behind the sulcature). *O. mimus.*

14 (13) Second ventral segment not so raised (only in a few species attaining a height about equal to that of its basal portion).

15 (18) Costae very short, shorter than the tumid basal portion of the segment; or nearly or quite obsolete, the sulcature being smooth; the depression absent or very faint and linear.

16 (17) Sulcature mostly smooth, the costae nearly absent, generally visible as traces only along the basal margin of the sulcature. *O. nesiotes.*

17 (16) Costae short, but strong; basal part of segment large and tumid. *O. vittativentris.*

18 (15) Costae of second ventral segment not very short, the middle ones generally long and not shorter than the basal portion of the segment, or with a distinct large or largish depression behind the costae.

19 (62) Second ventral segment flat behind the costae, no distinct depression.

20 (21) Second dorsal segment very abruptly and strongly raised from the base into a conical tuberculate form (middle tibiae without a calcar). *Nesodynerus conifer.*

21 (20) Second dorsal segment not so raised.

22 (25) Male with the clypeus whitish or yellow; basal abdominal segment not extremely coarsely punctured about the base of its dorsal surface in either sex.

23 (24) Middle tibiae without a calcar; propodeum with the posterior concavity only finely rugulose. *N. dilatatipes.*

24 (23) Middle tibiae with a calcar; propodeum with the concavity rugose. *O. kirbyi.*

25 (22) Male with the clypeus black; basal abdominal segment in both sexes extremely coarsely punctate at base. *O. kauaiensis.*

26 (19) Second ventral segment with a distinct depression behind the costae.

27 (28) Basal abdominal segment almost evenly curved from the petiole to the hind margin, when seen in profile; being not at all abrupt in front. *O. eludens.*

28 (27) Basal abdominal segment abrupt in front, having a distinct dorsal and anterior face, though the angle, where they meet, is rounded off.

29 (30) Second dorsal segment, seen in profile, with the highest point, to which it is raised, situated near the middle of the length of the segment. *O. homochromus.*

30 (29) Second dorsal segment with the highest point far before the middle of its length.

31 (32) Mesonotum with the minute interstitial puncturation distinct; propodeum rugose. *O. caenosus.*

32 (31) Mesonotum with the minute interstitial puncturation hardly noticeable; propodeum smooth but with shallow punctures. *O. leucozonias.*

(iv) DESCRIPTION OF SPECIES.

Odynerus homoeophanes.

Black, with dull, red markings. A median frontal spot and one on the posterior margin of the eyes, a line in the emargination of the latter, markings on the pronotum, mesonotum, scutellum, post-scutellum, mesopleura and sometimes on the propodeum, the posterior margins of from three to five abdominal segments, as well as the clypeus, a line on the scape of the antennae and the front tibiae (more or less) in the male, dull red. Apex of clypeus in the male slightly emarginate, truncate or almost so in the female. Head and face very densely punctured. Mesonotum very densely, rugosely punctate, with discal red lines which are usually connected with those of the posterior three-fourths of the lateral margin; scutellum and post-scutellum very densely punctured, the propodeum rugose. Basal abdominal segment dull, densely punctured, the second also dull and punctured all over though more coarsely and densely towards the apex, the red band dilated at the sides; beneath, the costae are long and well defined and the segment is widely flattened or faintly depressed beyond the apices of the costae. Wings hyaline, not iridescent, infuscate basally and along the costa. Length 9.5–13 mm.*

* The measurements are taken from the front of the head to the apex of the second abdominal segment.

Hab. Mountains of Oahu, widely distributed, but not abundant.

Odynerus eucharis.

Very like *O. homocophanes* but of smaller average size, the wings are less infuscate, the clypeus of the male is only spotted with red, that of the female resembling it or being wholly black, there is no red line in the emargination of the eyes, and the mesonotum is without the red discal and marginal lines. The puncturation of the mesonotum though very dense is distinct, being less rugose, that of the second abdominal segment fine and not close, except on the apical red band; its impression behind the costae is more punctate, but more shining. Length 7.5–10 mm.

Hab. Mountains of Oahu, widely distributed but not abundant.

Odynerus pseudochromoides sp. nov.

So like *O. pseudochromus* that it is only necessary to point out the distinguishing characters. The red prothoracic markings are continued backwards to reach the tegulae, the costae of the second ventral segment are moderately distinct and the surface between them is shining. In the female the mesothorax is also usually more shining. Length 7–10 mm.

Hab. Mountains of Oahu, common and generally distributed.

Odynerus paludicola.

Female: black with a red median frontal spot, a small spot on each side of the thorax touching the tegulae and the hind margin of the first abdominal segment red. Clypeus finely, head in front coarsely and closely punctured. Mesonotum shining, somewhat irregularly punctured, the minute punctures between the large ones easily seen with a powerful lens, but not dense; propodeum smooth and shining with large feeble punctures which become dense and more distinct in the concavity. Basal abdominal segment with shallow, even puncturation; second rather strongly convexly raised from the base; beneath, greatly raised above the costae, the latter fine but mostly distinct, the depression very narrow, the segment prominent on either side of it. Wings shining fuscous, without blue iridescence. Length 9 mm.

Hab. Oahu mountains 2000 ft.; not common.

Odynerus paranaias sp. nov.

Black, with shining fuscous wings, without the iridescence, the male with a red dot behind each eye, and the pronotum, mesopleura, and post-scutellum with red markings, as well as a red apical band on the first and traces of one at the sides of the second abdominal segment. Clypeus of male very deeply emarginate, of the female strongly and dentately, its sculpture consisting of fine and excessively minute punctures

mixed. Front densely punctured. Mesonotum with sparse irregular larger (but not coarse) punctures and distinct, very minute, but not dense, interstitial ones; propodeum with more or less evident puncturation, the punctures being coarse, feebly impressed and mostly obsolete. Basal abdominal segment with shallow and not close puncturation, second strongly convexly raised from the base in the male, less so in the female, but still strongly convex in profile; beneath, with the costae well developed, the depression wide, quite deep and distinct. Length, 9–11 mm.

Hab. Waianae, Oahu; near the coast.

Odynerus lithophilus.

Black, the two basal abdominal segments with a pale yellow apical band; the female usually in addition has yellow markings on the tegulae and post-scutellum, a small medio-frontal and post-ocular spot; the male may have all or some of the following yellow marks; the clypeus, a spot on the mandibles, a line on the antennae, a median frontal spot and one behind each eye, all the tibiae to a large extent, coxal and femoral spots, the base of some of the tarsi, spots on the pronotum, tegulae, scutellum and post-scutellum.

Front of head closely punctured; mesonotum with moderately strong and close puncturation, but variable in this respect, the surface dull or subopaque. Basal abdominal segment with coarse shallow punctures, second beneath with distinct and well-developed costae, and without a definite depression behind these. Length 7–11 mm.

Hab. Coasts and lowlands of Oahu, widely distributed and locally common.

Odynerus epipseustes.

Very like the common *O. nigripennis* Holmgr. but of larger average size, with the iridescence of the wings brighter, and the general colour of a deeper, more shining black. It is readily distinguished by the perfectly developed costae of the second abdominal segment beneath, which in *nigripennis* are obsolete or obsolescent and the impression behind the costae is very feebly indicated, the surface being polished. Length 12.5–16 mm.

Hab. Mountains of Oahu; much rarer—one in tens of thousands—than the ubiquitous *O. nigripennis*.

Odynerus tempe sp. nov.

Black, somewhat shining, the clypeus, front, pronotum, mesopleura, apical margin of the first abdominal segment, and sometimes the scutellum and propodeum marked with red.

Head in front closely punctured; the mesonotum with distinct punctures, more irregular posteriorly, the interstices shining and with the minute puncturation distinct; scutellum finely but distinctly punctured; propodeum somewhat smooth and with conspicuous punctures. Basal segment

of the abdomen not coarsely punctured; the second segment near the base somewhat abruptly and strongly raised; beneath, raised from behind the sulcature to about the height of the basal part of the segment; the costae distinct, the depression not wide but well-marked. Wings infuscate and with blue iridescence. Length 7.5–9 mm.

Hab. Iao valley, Maui. Very like *O. monobius* of Molokai, but at once distinguished by the much less coarsely punctured basal segment of the abdomen, as well as by differences in colour, etc. I have not met with the male of this species.

Odynerus monas sp. nov.

Black, opaque, slender, with the first abdominal segment mostly red, the second with red lateral spots. Clypeus very strongly emarginate, the front somewhat finely and shallowly and not closely punctured. Mesonotum dull, remotely and finely punctured, the two impressed lines posteriorly distinct; scutellum remotely punctured and with a median impressed line; propodeum dull, very finely rugulose, not or hardly punctate. Basal abdominal segment, except along the apical margin, almost impunctate, second longitudinally convex, but not abruptly raised from the base; beneath, with the depression very light, but distinct. Wings infuscate and with blue iridescence. Length 7–8 mm.

Hab. Molokai (500–1000 ft.) the male only taken, rarely and singly. Apparently allied to *O. cephalostictus*, but very distinct.

Nesodynerus paractias sp. nov.

Black, not shining, the front sometimes with a yellow dot, the hind margin of the basal abdominal segment sometimes obscurely testaceous. Clypeus very lightly emarginate. Front of head lightly, sometimes subobsoletely, punctured. Mesonotum finely and not closely punctured, the interstices between the punctures dull and with the minute system of puncturation distinct. First abdominal segment shallowly punctate, second convex, but not conspicuously raised from the base; beneath, the costae short, the segment behind these flat, the basal part large and tumid, the depression absent. Wings infuscate and with a blue iridescence. Length 5.5–7 mm.

Hab. Molokai, coast and lower slopes of mountains. Closely allied to *N. oblitus* of Oahu, but at once distinguished by the blue iridescence of the wings.

Odynerus aprepes sp. nov.

Black, not shining, mandibles largely red, wings fuscous with a blue iridescence. Clypeus impressed at the apex, but scarcely emarginate. There is a small yellow dot behind each eye, the front of the head being shallowly punctate. Mesonotum dull, sparsely and feebly punctured, the interstices between the punctures having a very minute and shallow

puncturation; propodeum dull, and without evident punctures, second abdominal segment, somewhat raised near the base, strongly longitudinally convex in profile, but not conically tuberculate; beneath, abruptly raised behind the costae to a height equal to that of its basal part, the costae distinct, the depression shallow but wide and evident. Length 7 mm.

Hab. Maui, on the lower slopes of Haleakala, a very obscure species. I have not seen the female.

Mr. J. Kotinsky read two papers: (1) "Some new Coccidae from the Hawaiian Islands;" (2) "Some new Aleyrodidae from the Hawaiian Islands," to be published elsewhere.

MAY 3rd, 1906.

The sixteenth regular meeting was presided over by Mr. F. W. Terry.

Notes and Exhibitions.

Mr. Wilder exhibited specimens of cypress twigs, the bark of which was gnawed off by the Roach (*Eleutheroda dytiscoides*).

Mr. Muir exhibited two specimens of *Coccinella repanda* from Fiji. These specimens agreed with Froggatt's figure and description (Misc. Pub. No. 592 Agric. Gaz. of New South Wales, 1902) also with Crotch (Revision of Coccinellidae), and differed from Hawaiian specimens in several features, viz.: smaller and less ovate; much more finely sculptured and duller; thorax black anteriorly edged with orange—red expanding into blotches at anterior angles of thorax, the Hawaiian specimens having the orange-red much larger and a central mark running posteriorly; the anterior mark on elytra V-shaped, not broken into three distinct spots; a third spot on posterior end of elytra. The two cannot be referred to the same species; which then is *C. repanda?* if the Fijian is the type, then what is the Hawaiian?

Mr. Kotinsky exhibited two specimens of *Cryptorhyncus mangiferae* collected by Mr. Haughs in Moanalua Valley upon a piece of wood at the base of a mango tree below the Polo grounds. According to Mr. Haughs none of the trees in the vicinity are less than four or five years old and the question how these insects got there is interesting. Upon stabbing the specimens Mr. Kotinsky heard them make a distinct noise much like that produced by the stridulation of some Longicorns.

Papers.

The Secretary read the following paper:

Note on Tomocera, a Genus of Scale-bug Parasites, with Description of a New Species. [Hymen.]

By R. C. L. Perkins.

One of our most abundant species of scale-bug parasites is that which commonly infests species of *Lecanium* in these Islands, and is known as *Tomocera californica*. Its very distinct appearance and the frequent occasions on which one notices it sitting or walking on plants infested with *Lecanium*, must make it familiar to all who pay any attention to the smaller insects. It has existed here for a long time, having been collected by Blackburn some thirty years ago; and these specimens were described subsequently as forming a new genus and species, by Cameron, under the name of *Moranila testaceipes*, two years after Howard's description, under the name of *Tomocera californica*, had appeared. Yet I have no doubt that both here and in California this parasite has been introduced by man, with scale-infested plants. Of my own observation I know the Australian region to be rich in *Tomocera* and allied forms, and I believe the same to be true of the Oriental Region.

From China Mr. Koebele ten years ago introduced parasites for *Ceroplastes rubens*, once a most unsightly pest here. Amongst these was a species of *Tomocera*, I believe as yet undescribed, possibly on account of its extraordinary resemblance to *T. californica*. This undescribed species likewise attacks *C. ceriferus* in middle and north Queensland, but has apparently not yet reached South Queensland, nor New South Wales. I believe it has certainly been imported from China into North Queensland, and will eventually reach New South Wales, even if unassisted by entomologists in distribution.

Ceroplastes is not noticeably a pest in the parts where we found this *Tomocera*. I have not at the time of writing sufficiently good specimens of the males of *T. californica*, to enable me to say more than that in this sex, the specific differences are probably as slight as in the females; and in the case of the latter the extraordinary resemblance to *T. californica* necessitates only the briefest of descriptions. I therefore diagnose the species as follows:

Tomocera ceroplastis sp. nov.

Female; color and sculpture as in *T. californica*, but with the hind coxae never dark and metallic on the basal part, these being uniformly testaceous or brownish yellow. The large post-petiolar segment is uniformly smooth, or nearly so, while in *T. californica*, there are two large subcircular (apparently slightly raised) areas, of very dull appearance, owing to a covering of extremely minute microscopic tomentum. The size is that of well developed *T. californica*, the latter varying very much in size.

Hab. China, whence it was introduced by Koebele into the Hawaiian Islands, Queensland, Cairns and Bundaberg. My specimens I bred at Cairns. Koebele (2327) bred it at Bundaberg in October, 1904, two of these examples being in the collection of the Territorial Bureau of Agriculture. A short while since, I took specimens running on a tree of *Elaeocarpus bifidus* on Tantalus, this tree bearing a few scattered scales of *Ceroplastes rubens*.

The following paper was then read by the author, who exhibited specimens illustrating the life cycle of the moth:

On the Sweet-potato Vine Borer (Omphisa anastomosalis Guenee).

By O. H. Swezey.

Omphisa anastomosalis Guen.; Hampson, Fauna of British India, Moths, IV, p. 382, fig. 207, 1896.

Evergestis anastomosalis, Guen; Meyrick, Fauna Hawaiiensis, III, Part IV, p. 361, 1904.

This Indo-Malayan moth was first recorded for Honolulu in 1904. Since then it has no doubt been on the increase, and may possibly before long become a garden pest, if not so already. During January, February and March, 1906, I found the larvae boring in vines of sweet potato in my garden. Of about half a dozen hills, all were found to be infested. The larvae were found boring in the vines near the base, and hence just at the place to be the most injurious. Often two or more near together in the same vine, living upon the green, juicy pith of the stem. They probably do considerable boring in the potatoes also, as one was found in a potato from the market.

Description of larva.—Length about 30 mm., width about 3½ mm., head 2 mm.; color pale yellowish white, with conspicuous brown, very broad and flat tubercles; head yellowish

brown, ocelli black except the two upper and the lowest one which are white, mandibles black, a black line on postero-lateral margin of head; dorsal tubercles of two rows beginning with segment three, in each row, two per segment except segment four; a row of tiny tubercles, one per segment, just antero-ventral to each of the anterior dorsal tubercles in segments five to twelve; the spiracles of segments five to twelve have a group of four tubercles surrounding each, by their union on some segments there are but three of these, a similar cluster of tubercles occupies the position corresponding to spiracle on segments three and four; a line of tubercles just dorsal of the base of the feet; four ventral tubercles on segments 5, 6, 11, 12 (those segments having no feet); the ventral tubercles have two or three hairs, others mostly but one, a few hairs on the head also.

Description of pupa.—16 mm. long and 3 mm. wide, nearly cylindrical, abruptly tapering at the two posterior segments; uniform medium brown a slightly darker band on posterior margin of abdominal segments; tiny short hairs where there were hairs on the larva; wing-cases a little pointed, extending to posterior margin of fourth abdominal segment, one pair of leg-cases extends a little farther, about half way on the fifth segment; cremaster very short, blunt with a few hooked spines. The pupa is found in a slight cocoon inside the vine where the larva fed.

Habitat as given by Hampson: China, Sikhim, Khasia, Nilgiris, Ceylon, Burma, Andamans, Java, Duke of York Island.

In the discussion following these papers, Mr. Kotinsky said that although he had tried many expedients for breeding parasites from *Ceroplastes rubens*, he had so far not met with success. The one specimen of *Tomocera ceroplastes* secured was cut out of the scale. Mr. Craw stated that out of a number of consignments of parasitized *Ceroplastes* sent by him to Australia no parasites were secured.

JUNE 7th, 1906.

The seventeenth regular meeting was presided over by Mr. F. W. Terry.

Member elected: Mr. F. Muir.

Notes and Exhibitions.

Mr. Kotinsky exhibited specimens of the Coccid *Morganella maskelli* Cock. on shoots of fig. After comparison with Leonardi's figure of *Aspidiotus* (*Morganella*) *longissimus* he concurs with Maskell in taking the local insect to be but a variety (*ornatus*) of the Demerara species.*

He also exhibited two Chalcids bred from *Ceroplastes rubens* one of these is a *Microterys*, probably *flavus;* it differs from this in that the light wedges on the wing unite, thus completely separating the apical dusky spot into a bar and spot. He further exhibited a Scymnid bred from *Ceroputo bahiae*, Ehr., on *Salicornia*, received from Mr. Koebele, collected near Alameda, California. A colony of twelve of this Scymnid were released at Waikiki upon a Banyan tree infested with *Pseudococcus nipae.* He also exhibited an avocado Pear twig which contained a batch of defunct eggs of some Locustid. Mr. Swezey expressed the opinion that the eggs were laid by *Elimaea appendiculata* when the twig was still very young and tender; this ascribes to this Locustid the habit of laying eggs in both twig and leaf edges.

Mr. Kotinsky also exhibited specimens of *Agromyza* sp., a Tortricid moth and several Chalcidoids bred from Radish leaves.

Since presenting the above note the author sent specimens to Mr. Newstead who kindly compared them with a specimen of Morgan's type lot in his collection, and found that they "agree in every detail with Morgan's co-type of his *Aspidiotus longispina.*" This determination leaves Cockerell's *M. maskelli* and Maskell's var. *ornatus* as synonyms of Morgan's name.

PROCEEDINGS

OF THE

Hawaiian Entomological Society

I

PART 3

HONOLULU, JULY 1st, 1907

PRICE. 50 Cents

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JULY 5th, 1906.

The eighteenth regular meeting was presided over by Mr. F. W. Terry.

Notes and Exhibitions.

Mr. O. H. Swezey exhibited specimens of three species of Midges and read "**Notes on some Cecidomyidae not previously reported in Hawaii.**"

1. *Diplosis sorghicola* Coq. was bred from the tops of sorghum. The larvae feed on the juices of the growing seeds causing them to blight. They pupate in the same place where they feed.

2. *Diplosis* sp. was bred from larvae feeding upon the spores of a rust on sorghum leaves. These drop to the ground to pupate.

3. *Contarina solani* was bred from tomato buds where the larvae fed upon the young ovary of the blossom causing the buds and blossoms to blight and eventually fall off. The larvae of this species also pupate in the ground."

Papers.

Notes on Cryptorhynchus Mangiferae (Coleoptera).

By D. L. Van Dine.

Without going into the problematical question of the introduction of *Cryptorhynchus mangiferae* into these Islands or its present economic status, I will submit a few observations and notes taken during the year on the occurrence, habits and life-cycle of this recently discovered insect-enemy of mangoes in Hawaii. In reviewing my office records, I find that it is just one year ago today, namely, July 5, 1905, that the weevil was first called to my attention. The first specimen observed was a pupa that Mr. J. E. Higgins had discovered within the seed of a mango that he had collected at Mr. Allan Herbert's former place in Kalihi, Oahu. Two days after, July 7th, I visited the Moanalua Gardens where I knew Mr. MacIntyre, the Superintendent, to be planting seeds and there found within seeds of various varieties what I considered unquestionably the larvae, pupae and adults of the same species. On July 9th, the pupa collected by Mr. Higgins developed into an adult, confirming the identity of the specimens taken at Moanalua. Mr. MacIntyre was not remov-

ing the husks from the seeds he was planting and had not noticed the presence of the weevil. He informed me, however, that for the past eight years for horticultural reasons he had removed the husks from all seeds he planted but that because of a shortage of labor he had not done so for the two previous years. It is reasonable to suppose from this that the weevil made its advent into the Moanalua Gardens not earlier than 1903. Inquiry of Mr. David Haughs, Mr. Higgins and Mr. G. P. Wilder brought out the information that the weevil had not up to that time occurred in Honolulu. All had planted seeds from year to year and Mr. Haughs in his connection with the Territorial Nursery had planted mango seeds for many years and practised removing the husks from them before doing so. The distribution last year, then, so far as is known, was confined to this Island and extended from Kalihi to Moanalua.

On July 11th, specimens of the weevil were forwarded to the United States Bureau of Entomology at Washington for determination. Under date of July 26th, Mr. E. A. Schwarz of the Bureau reported it as *Cryptorhynchus mangiferae* originally described by Fabricius in 1774.

Larvae, pupae and adults were to be found in the seeds of the fruit all through July. During August, the seeds of fallen mangoes contained some pupae and many adults. As late as Sept. 11th, seeds beneath trees in the infested district contained adults but in no great numbers. It appeared that the weevils remained in the seeds for a time after completing their full development. On the last date mentioned three living adults were removed from as many seeds and placed in tightly corked phials beneath a plug of cotton. On Oct. 13th, all these specimens were living. I was absent from my office nearly a month but on my return, Nov. 15th, one weevil had died. On January 3rd, another weevil failed to show signs of life and the third specimen lived until February 10. From these observations I was convinced that the insect could pass a considerable period in a dormant state, a necessary power if it proved to be a special feeder of the mango seed. On the same date as the above experiment was begun, a quantity of the seeds from fallen mangoes from the infested district was placed in a breeding cage to determine the latest date the adults would continue to leave

the seeds or if some would remain within the seed until the next fruiting season. I found that the weevils showed no tendency to remain in the seeds after once making an exit through the husk. No specimens appeared in the cage from the seeds until October 8th, when four specimens were found. On October 15th, one specimen was taken out and on November 16th, two specimens, the last to appear, were found. By this time all traces of the weevil had disappeared in the infested districts. Diligent search failed to show where they were until January 30th, when I ran on them after a long hunt, feeling sure they would be found in a state of hibernation somewhere. On that day I found them by the hundred in the crevices of an old board fence and stone wall beneath a group of neglected mango trees in a deserted kuleana* in Moanalua Valley. No precaution had been practised there in regard to the destruction of the fallen mangoes and refuse seeds.

The weevils were to be found in a state of hibernation throughout the following months up to May 16th, when one active adult was observed on the foliage of a mango tree. From the last date on, hundreds of mangoes were opened, at intervals when I could visit the infested district, to find evidences of the larvae. Not until May 28th was the search successful when one specimen within the seed of a nearly full-grown mango was found. This was a very minute larva and a faint discolored line leading from its tiny burrow in the seed through the husk and flesh to the rind indicated its mode of entrance. On other fruits I then observed what I took to be and still think are the eggs of this weevil although I have not succeeded in hatching any of them to note the resulting larvae. The eggs appear on the surface, light yellow in color, oval, and are invariably situated alongside a slight incision in the skin from which has exuded a small amount of juice that envelops them. In several instances I found the faint discolored line leading from the rind to the seed infested with newly hatched larvae but as the larvae develop to a size easily observable to the unaided eye, all evidences of the means of entrance become effaced. It is to be seen from this that the seed is infested rather late in the development of the fruit.

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*A small, native homestead.—Eds.

I can add but a few generalizations on the life-cycle of the weevil. Larvae were found in various stages of development up to June 27th, when the first pupae were observed within infested seeds. On July 3rd the first adult weevil to be seen of this year's brood was taken from the seeds of mangoes under observation in the laboratory. To summarize—the adults became active May 16th, the first larva was found May 28th, the pupae appeared June 27th, and the adults on July 3rd. In a very general way the life cycle is approximately 48 days. I am inclined to think there is but one brood a year.

This paper was illustrated by specimens and photographs, and was followed by general discussion. Mr. O. H. Swezey stated that of thirty mangoes collected at Kalihi he found only three free from infestation; on the 12th of June he observed the first adults in mangoes collected at the same place. Mr. F. Muir exhibited a series of weevils from Fiji. One of these was very similar in appearance to *Cryptorhynchus mangiferae* and presumably injured mangoes in Fiji in a similar manner. Of two sugar cane borers one was recognized as identical with the Hawaiian species (*Sphenophorus obscurus*) while the other was entirely different.

AUGUST 2ND, 1906.

The nineteenth regular meeting was held at the usual place, Mr. G. W. Kirkaldy in the chair.

NOTES AND EXHIBITIONS OF SPECIMENS.

Mr. D. L. Van Dine exhibited specimens of *Buprestis aurulenta* (Linn.) collected by Mr. H. L. Sturtevant, Honokaa, Hawaii, on January, 1906, and determined by Mr. E. A. Schwarz. It is common along the Pacific Coast and British Columbia, and was probably introduced into Hawaii in Pine-lumber.

SEPTEMBER 6TH, 1906.

The twentieth regular meeting was held at the usual place, Dr. R. C. L. Perkins in the chair.

NOTES AND EXHIBITIONS.

Mr. J. Kotinsky exhibited specimens of recently introduced economic insects, including *Calosoma* sp., a species of Histeridae,

and other manure beetles; among Hymenoptera, *Eucoila impatiens* Say on Horn-fly and other dung-Diptera, and a new species of *Perissopterus*, the last from China, bred from the Coccid *Lepidosaphes ulmi* (Linn.) on Camphor, and sent by Mr. Compere, all the others being sent by Mr. Koebele. He also exhibited leaves of a Cycas infested by a Coccid, *Chrysomphalus aonidum* (Linn.), also from China. Many of the Coccids were perforated by the exit holes of four or six parasites, a species which has not been seen thus far. The plant was confined in a cage in the Insectary with local plants infested by the same Coccid.

Dr. R. C. L. Perkins then presented "Notes on a collection made at Kilauea, Hawaii, during July," and exhibited specimens.*

Papers.

Observations on the Life History of Oliarus koanoa Kirkaldy.

By O. H. Swezey.

On August 12th, 1906, while digging for insects among the decaying leaf-bases and fibrous matter of tree-fern trunks, in the forests of Mt. Tantalus, I discovered nymphs of some species of leaf-hopper, which, on rearing, proved to be *Oliarus koanoa*. The nymphs were in cavities or tunnels lined with a white fibrous material which resembled mold, or spider's web, and which is an excretion from the terminal abdominal segments of the nymph. Each nymph had a tuft or brush of straight fibers of this material, extending backward and slightly upwards, and spread somewhat fan-shaped. It is probably rubbed off accidentally in the movements of the insects, and serves to aid in hiding or protecting it. It is rapidly replaced. A specimen from which it was entirely removed, had it completely produced again within 24 hours.

The full-growth nymph is about 5 mm. long, and 2 mm. wide, about even width throughout; the tuft is from 2 to 5 mm. Whole insect whitish, with pale greyish markings on the thorax, and 5 dorsal bands on the abdomen in front of the cottony tuft. Eyes dark brown, partially hidden behind projecting margins of the frons. Rostrum extends beyond 2nd abdominal segment. Sensory pits are very numerous; a row near the margin of frons, many

*This has since been incorporated in Dr. Perkins' Presidential address.—Eds.

on dorsal part of thorax and wing cases, a transverse dorsal row on abdominal segments 2, 3 and 4. The abdomen is obliquely truncated behind the 4th segment, so that the dorsal surfaces of segments 5, 6 and 7 are directed nearly posteriorly. These contain the numerous pores from which the fibers of the tuft are extruded.

The nymphs probably feed upon the fern roots in the fibrous mass of the outside of the fern trunks, or on juices of the decaying material. The largest nymphs collected transformed to adults in a few days.

Very little has been recorded of the life history and habits of the species of the sub-family Cixiinae to which this insect belongs. In Psyche VI, p. 353, 1892, Townsend records the discovery of the eggs of *Oecleus decens* laid in the leaves of Yucca. A tiny mass of white fluffy material covers each puncture.

In *Ohio Naturalist*, IV, 2, p. 42, 1903, Osborn describes *Myndus radicis*, and gives its habits so far as known. The nymphs are very similar to the ones I have described above, and live on the roots of grasses and other plants, in crevices lined by the white fibrous material from their abdominal tufts.

Dr. Perkins has informed me that he found the nymphs of an Australian species beneath the bark of trees, particularly Eucalyptus trees, also nymphs of a Hawaiian species beneath the bark of Ohia trees. From these few instances, it may reasonably be inferred that the nymphs of other species of this family of Fulgoroidea, will be found to have similar obscure habits, which accounts for there being so little known concerning them at present.

In the discussion that followed, upon the use of the pulverulence produced by the nymphs and adults of this group of insects, Dr. R. C. L. Perkins stated that while some means of protection may be afforded, by this excretion, to those living exposed, it can hardly apply to such species as are found hiding under bark. Despite this protection, they are heavily parasitized in Australia; for instance, the nymphs of *Jamella australiae* Kirkaldy, a Poekillopterine living on *Pandanus*, were found living under ground and preyed on by *Baccha siphanticida* Terry, a Syrphid-fly, which also preys on *Colgar peracuta* (Melichar) and various species of *Siphanta*.

OCTOBER 4TH, 1906.

The twenty-first regular meeting was held at the usual place, Mr. G. W. Kirkaldy in the chair.

NOTES AND EXHIBITIONS.

Mr. G. W. KIRKALDY exhibited specimens of a large black Staphylinid Beetle, which came to light commonly. Mr. Schwarz has doubtfully determined it, as *Philonthus prolatus* Sharp, a Japanese species. Mr. Kotinsky observed that this species occurs quite often in manure.

PAPERS READ.

Tribolium ferrugineum (Fabr.) [Col.], an Enemy of Megachile palmarum Perkins [Hymen].

BY JACOB KOTINSKY.

Among a large colony of cells of the bee, 2 specimens of the beetle were detected. When one of these cells was opened a larva of the same beetle was found within and no trace of any stage of the bee. Several bee cells had the side exit-holes of the beetle. The cells were put away in a breeding tube and several more beetles issued subsequently. The presumption is that the beetle oviposits upon the bee cell, and the grub therefrom bores its way into the cell. Whether its food therein is the pollen bread or the bee larva has not been ascertained, but the latter invariably dies either from starvation or injuries inflicted by the beetle larva. This Megachilid being seriously destructive to many shade and ornamental plants about Honolulu, it was gratifying to find an enemy preying upon it. A remarkable coincidence is that the same species of beetle was collected in a recent large shipment of rice for Honolulu.

Mr. F. W. Terry remarked that the beetle-larva might have been feeding on the pollen in the bee-cells, and therefore it would be only indirectly an enemy of the bee.

NOVEMBER 1st, 1906.

The twenty-second regular meeting was held at the usual place, Dr. R. C. L. Perkins in the chair.

Notes and Exhibitions.

Mr. O. H. Swezey exhibited a collection of eleven species of *Odynerus* collected by him in Iao Valley, Maui, July 29th, 1906, consisting of *O. nigripennis* (numerous), *O. insulicola* (7), *O. molokaiensis* (4), *O. purpurifer* (3), *O. instabilis* (3), *O. konanus* (3), *O. ecostatus* (3), *O. sandwichensis* (1), *O. camelinus* (1), *O. homoecogaster* (1), and *O. naiadum* (1). Both he and Dr. Perkins commented on the good luck that attended him on that day, to have collected eleven out of the sixteen species known to occur in that valley. Dr. Perkins further stated while he collected *O. molokaiensis* on Molokai in 1892, he found none of it on Maui in 1893 and 1894. In 1902 however this species was found very abundant in Iao Valley, from which he concludes that it must have been introduced there by the agency of man. Some of the species collected by Mr. Swezey were not collected by himself in that valley and some of them, as *O. instabilis*, were very rare there. He further remarked that, by a careful study of the habitus, mode of flight etc., of the different species, when in the field, the most closely allied forms could be discriminated, even where they are not easily separated in the study. Thus, four examples of *Odynerus* recently collected on the wing amongst swarms of *O. pseudochromus*, but suspected of being different, were found to include one peculiar variety of that species, one *O. pseudochromoides*, and the two much rarer species *O. paludicola* and *O. leiodemas*. To be able to pick out the choice species from the very common ones which they resemble, is a great help to the collector in these Islands, where large genera of closely allied species are frequent.

Mr. J. Kotinsky exhibited books recently purchased by the Board of Agriculture and Forestry, among them a copy of Ruusscher's "Histoire Naturelle de la Cochenille, Justifiée par les Documens Authentiques," published in Amsterdam, 1729, the even pages being in Dutch and the odd in French. The titles quoted above indicate the method of investigation pursued by the author.

Dr. R. C. L. Perkins exhibited two species of the Coleopteron *Xyleborus*, a male and female of each. The scooped-out head of the former as distinct from the normal head of the latter was the principal feature of the exhibit. Dr. Perkins also exhibited six species of *Plagithmysus* and one of *Clytarlus*, collected at the Volcano House. One species of the former was undescribed and would shortly be named by him after Mr. Giffard. He also exhibited a specimen of an undescribed species of *Callithymsus*, taken on a stump of Mamake (*Pipturus albidus*) on Mt. Tantalus.

Papers.

On a Species of Proterhinus from Samoa [Coleoptera].

By R. C. L. Perkins, D. Sc.

The genus *Proterhinus*, constituting the family Proterhinidae, with not less than 130 known species inhabitating the Hawaiian group, has hitherto been recorded only from these islands. I am now able to describe a species from the Samoan group, distant from the Hawaiian by more than two thousand miles, and lying directly between the latter and New Zealand. It will be remembered that New Zealand is the home of one of the two species of *Aglycyderes*, constituting by themselves a peculiar family, and one which alone amongst the Coleoptera has any possible affinity to the Proterhinidae. I anticipate that when the islands of the Southern Pacific are thoroughly investigated by skilled collectors of Micro-coleoptera that other forms of Proterhinidae will be discovered, and possibly some that will more nearly connect these with *Aglycyderes*. The Samoan species here described is one of the smallest in the genus, and superficially (in form colour and clothing) quite resembles some of the more commonplace Hawaiian forms, so far as the ♂ sex (which alone is known to me) is concerned. The single example was bred from the woody drupe or the stem of attachment of a cocoanut, imported as seed from Samoa. No species of *Proterhinus* is known to affect the cocoanut in the Hawaiian islands, nor indeed is any native wood-eating beetle to be found on the lowlands here, all such having been exterminated by certain foreign ants within the range of which they cannot exist.

Proterhinus samoae sp. nov.

Ferrugineus, elytris circa margines et suturam nigricantibus, parce setis pallidis appressis aliisque perpaucis erectis vestitus ♂ Long. vix 2 *mm.*

Ferruginous, with the lateral, apical and sutural margins of the elytra bordered with black. Antennae slender and rather long, basal joint elongate but very robustly clavate; second short, roundish or subquadrate; third much more slender, gradually widening to the apex, elongate; fourth to ninth generally resembling the third; the 9th a little longer and wider at the apex than the 8th; 10th and 11th distinctly wider than 9 and forming a feeble two-jointed club. Eyes prominent, but rather small. Prothorax constricted in front and much narrowed, much less so behind, so that the hind margin is much the longer, sparsely clothed with pale setae like those on the head. Elytra similarly clothed and also with a few erect thick whitish setae, the humeral angles subrectangular but not acute nor produced. Legs clothed with pale setae, the lobes of the anterior tarsi of moderate size and the femora moderately strongly clavate for the genus.

DECEMBER 6TH, 1906.

The twenty-third regular and second annual meeting was held at the usual place, Dr. R. C. L. Perkins in the chair.

NOTES AND EXHIBITIONS.

MR. W. M. GIFFARD exhibited a cabinet-drawer containing a collection of Hawaiian Longicorns and Curculionids, collected almost entirely by himself on Mt. Tantalus, Oahu and Kilauea, Hawaii. He accompanied the exhibit with some observations on the habits of the insects and the rarity of some of them. Dr. Perkins commented upon the excellent condition, appearance and state of preservation of the collection, observing that if well attended to there was no reason why it could not last indefinitely.

MR. KIRKALDY exhibited a specimen of the Blattid *Nauphoeta cinerea* (Oliv.) (*N. bivittata* of the "Fauna Hawaiiensis"). Mr. Kirkaldy also exhibited specimens of a marine and estuarine prawn *Leander debilis* (Dana) which had not been recognized since Dana's time, though very common around Honolulu. Also

specimens of a large red-brown *Julid* (Myriapod), not recorded in the "Fauna Hawaiiensis," and a recent introduction.

Dr. PERKINS made the following three exhibits:

(1) A Jassid, common on the mountains near Honolulu, of a pale yellow or bone colour, is remarkable for the fact that the male has a pronounced pattern of black markings while the female is unicolorous. Rarely the male is like the female, without a pattern. Still more rarely it has the pattern much reduced; the female on the other hand appears very rarely indeed to have black markings. Other Hawaiian Jassids exhibit a similar striking sexual dichromatism. Elsewhere the phenomenon seems not to be common, as I can only recall one species of Jassid amongst our large Australian material that exhibits it, the very abundant green *Nephotettix apicalis* (Motschulsky).

(2) A species of *Reduviolus* (*R. rubritinctus* Kirkaldy, but probably not *R. rubritinctus* of Blackburn) is as is well known, remarkable for the incrassate basal joint of the antennae. Recently on picking up a specimen on Tantalus I noticed with the naked eye a peculiar projection on the head and on examining this at home with a lens I saw that it was one of two stout blunt spines, there being one of these on each side of the head in front of the insertion of the antennae. Blackburn makes no mention of these spines in his long description of the unique type, and as his example was from Maui, while all those mentioned in the "Fauna Hawaiiensis" were from Oahu, it is probable that these are distinct. There is no such structure in any other Hawaiian *Reduviolus* that I possess here.

(3) A collection of over fifty species of bugs recently collected at Kilauea, Hawaii.

The President then read the annual address:

Insects at Kilauea, Hawaii.

By R. C. L. PERKINS, D. Sc.

In last year's address I gave an account of the insect fauna of a portion of the main mountain range of Oahu, to illustrate in a general way what one may expect to find in a reasonably good locality on the leeward side of the less lofty mountains, such as are found on Oahu, Kauai and Molokai. Tonight I will speak of the insects that are found in the vicinity of the crater

of Kilauea, a locality where insect life is particularly abundant, and which is situated at an elevation of four thousand feet in the forest region on the slopes of the lofty mountain, Mauna Loa. Here, for reasons that I shall subsequently state, a very large number of species of insects are to be found within a very limited area.

Like most productive localities in the islands the neighborhood of Kilauea is moderately dry and fine weather is the rule there. In this it contrasts very strongly with the country a few miles to the North-east, and at a lower elevaton; where day after day may be passed in drenching rain, while at the same time at Kilauea the forenoons at least are bright and sunny, though later in the day the whole country may be wrapped in dense white mist.

In order that the cause of the richness of this very limited locality may be understood, the number of species that are found being far greater than one would expect in so comparatively recent a portion of the islands, I will give a brief account of the country in the immediate neighborhood of the crater, dividing it into three districts.

(1) The crater itself is surrounded by a nearly level plain, which on the west side supports a stunted and more or less sparse vegetation. This consists of small examples of the Myrtaceous "Ohia" tree (*Metrosiderus*) some of which are almost sure to be found in full bloom at all seasons of the year; beneath and between these the Epacridaceous *Cyathodes*, a New Zealand or Australian element of the flora, and the very variable *Vaccinium reticulatum* are conspicuous, together with species of *Coprosma* and *Raillardia* and, in moister and shadier spots especially, various species of Cyperaceae and the lilaceous *Astelia*, *Dianella* and *Smilax*.

This comparatively open, and in some parts very exposed, country is the home of many interesting insects not found in the adjoining and better wooded parts. Towards Kilauea-iki and southwards the growth is more dense, the ground is damper and the moisture-loving species of plants more numerous, but this denser forest lacks many of the species conspicuous on the open plain.

(2) By walking a mile or more along the Kau road, then facing towards the summit of the mountain and crossing the open country such as I have just described, one enters a totally different locality. The forest here is well-grown and consists of large Koa and Ohia trees, in some places the former (*Acacia koa*), in others the latter predominating; in some spots tree-ferns, in others bracken, abound, while various trees of smaller growth are numerous, species of *Pelea*, *Myrsine*, *Myoporum*, *Sophora*, occasionally *Pipturus* and *Euphorbia* being amongst these. In some spots *Alyxia olivaeformis* forms dense hanging masses in these trees.

(3) Immediately behind the Volcano House Hotel one quickly enters another well marked district. There is a forest that is essentially formed of Ohia, the woods are always damp, the undergrowth largely consists of great tree-ferns, but a variety of smaller trees are scattered amongst these, *Pipturus*, *Myrsine*, *Cheirodendron*, *Broussasia* and occasional arborescent *Lobeliaceae*. The more open parts of this forest have now become invaded by an imported raspberry, which bears an abundance of very pretty but insipid berries of an altogether inferior quality. On the Hilo side, where the forest is generally of a similar character this importation is a still greater pest.

A three mile walk will cover all three of the regions that I have described above, while owing to the fine condition of the roads, over which stages run daily, and further by taking advantage of the Hilo railroad, many other localities can now be visited from Kilauea for the purpose of a day's collecting, which before were inaccessible. Consequently, I have sometimes specially referred to desirable insects that can easily be obtained by making such excursions, though nearly all that I have listed can be obtained in the localities that I have particularly described above.

If I were asked to define these three regions by their most striking productions I should say that the first is remarkable for the great numbers of Nocturnal moths (*Agrotis*) that frequent its more open parts. At certain seasons these moths rise up every few yards, as one walks along, often several take flight together, but in general they are wild and difficult to catch. No doubt on a favorable night they could be obtained in any number on

the flowers of the Ohia trees, to which they resort for food. Practically all the bees and wasps found here are burrowers in the ground, or they nest in holes in the lava blocks, those which nest in tree trunks, being absent or present only as stragglers.

The second region or Koa forest is well characterized by its Longicorn beetles of the genus *Plagithmysus* and *Clytarlus*, by its abundance of Anobiidae, large black *Fornax*, the Cistelid *Labetis*, and the many wasps of the genus *Odynerus*, that frequent the tree trunks.

The third is rich in moths of the genus *Leucania*, in species of Carabid beetles, which, however, excepting in a few cases, are rare in individuals; in special species of Nitidulidae, and in its interesting and peculiar bees of the genus *Nesoprosopis*. It also produces the large and remarkable weevil, *Nesotocus munroi*.

I will now take the Orders of insects seriatim and list some of the species that I have met with at Kilauea. As in my last year's address I shall deal only with the endemic insects, omitting all reference to introduced species.

Thysanura.

Machilis heteropus is common as in other wooded localities throughout the islands, but no native *Lepisma* nor *Iapyx* have been found at Kilauea and probably they do not occur on the island of Hawaii. The Collembola are numerous in individuals at least, but probably all the species are introduced, excepting possibly some of the *Achoreutidae*, which congregate beneath the bark of trees.

Orthoptera.

The ubiquitous roach *Phyllodromia obtusata* is of course abundant, its egg capsules here, as elsewhere in the islands, being destroyed by the Eupelmine Chalcid, *Solindenia picticornis*. The Locustid *Brachymetopa nitida* only just attains so high an elevation as Kilauea and is not common there, but abounds lower down in the Olaa and Hilo forests, and it is interesting to observe that examples from the different localities exhibit apparently more or less definitely distinct variations, as if tending to become distinct species. *B. nitida* has a not-green form of the female, in Olaa every fourth or fifth specimen of this sex being either fuscous, brownish or yellowish. The males on the other hand are always, or nearly always, green. In Olaa the unique

specimen of *Conocephaloides* was taken on a *Pipturus* tree. Around the volcano the little Gryllids *Paratrigonidium varians*, *grande* and *pacificum* are found, while lower down, towards Olaa, is a rich locality for these, *P. viridescens*, *filicum* and *freycinetiae*, being found in addition to these above named. I have spoken of the distinct habits of these difficult species in the Fauna Hawaiiensis. *Leptogryllus elongatus* is found in the fern forest in some numbers, but *L. similis* is much rarer.

NEUROPTERA.

Of the Hemerobiidae our single species of *Megalomus* is common; *Nesomicromus* is very well represented by *vagus*, *paradoxus*, *longispinosus*, *brunnescens*, *rubrinervis*, *subochraceus* and *minimus*. The second and third of these are the most interesting and the rarest. Lacewing flies are very common; *Anomalochrysa peles*, *montana*, *rufescens*, *frater*, *longipennis*, *deceptor*, *raphidioides*, *proteus* and *rhododora* are all found, though *rufescens* and *raphidioides* prefer a lower elevation on the Kau side; *paurosticta*, *princeps*, and probably others, are found in the densest forests in Olaa in the winter months. *A. peles*, *rhododora* and its remarkable var. *xerophylla* and *longipennis* are the most desirable of the volcano species. *A. montana* is peculiar in frequenting the low-growing shrubs of the open country (*i. e.*, the first region described by me) where one disturbs it in numbers as one walks along in the daytime, at certain seasons. *Formicaleo wilsoni* is found in the same open country about two miles from the Volcano House on the Kau side.

Of the dragon flies, *Anax strenuus* and *Nesogonia blackburni* may be observed anywhere, owing to their powers of flight. Specimens of *Agrion* are numerous around the hotel vegetable garden in the fern forest, as well as on the path near Kilauea-iki, and generally on the Hilo side of the crater. They are also abundant in Olaa and about Hilo. *Agrion nigro-hamatum*, *asteliae*, *amaurodytum*, race *peles* and var. *fallax*, *calliphya* race *microdemas*, *nesiotes* and *deceptor* are found close to Kilauea, to which at low elevations may be added *A. xanthomelas*, *pacificum* and *blackburni*. *A. nesiotes* is by far the most peculiar and interesting of these species and it is not rare.

Psocidae are very numerous in individuals, but the species being very unstable in specific and even in generic characters are

most difficult to deal with, and unless they be specially collected and carefully mounted, while fresh, are of little practical use. The spread of many imported species amongst the native ones, both belonging to the same genera, has rendered the study of the endemic fauna still more unsatisfactory.

RHYNCHOTA.

At a recent meeting of this Society I exhibited a collection of over fifty species of Rhynchota that I had recently taken in ten days of general collecting in the immediate neighborhood of the Hotel. These included *Capsidae* (10 species), *Reduviolus* (7), *Nysius* (5), *Sephora* (1), *Orthoea* (1), *Ithamar* (1), *Acanthia* (2), *Oechalia* (1), *Coleotichus* (1), *Oliarus* (4), *Jassidae* (7), *Delphacidae* (10), *Psyllidae* (several). By extending one's collecting ground to Olaa and adjoining districts this list could be much increased, or even by special research at Kilauea itself, since the list includes no species of Emesidae, Anthocoridae, etc. Some of these I have on other occasions found very numerously there. The species of *Acanthia* were found running on tree trunks, high up above the ground, in the damp fern forest. I do not remember to have noticed them in this situation before. Of the other bugs the species of *Reduviolus* are the most interesting, each having its own special habits or habitat, but on the whole the bugs are much less interesting than the Neuroptera of Kilauea.

THYSANOPTERA.

As everywhere in the islands, Thysanoptera are very abundant and the species are probably numerous. They require special collecting and mounting, and as they probably present long series of very closely allied species like the genera of Hawaiian insects, the discrimination of the species is likely to be one of great difficulty. The wingless forms are much more bulky than the winged, as is so often the case in many apterous or subapterous Rhynchota.

COLEOPTERA.

It is not possible at present to compile a complete list of the Kilauea Coleoptera, partly because many species are not as yet described, and partly because some, collected abundantly in other localities, have not specially been registered from this one This latter remark applies still more strongly to the Lepidoptera

About a score of species of Carabidae are found in the immediate neighborhood of the volcano, many of the species are rare and require special search. The fern forest near the hotel vegetable garden is about the best locality. The large *Barypristus rupicola* is, however, confined to the neighborhood of Koa trees. The following list includes such species only as are found near the volcano, others no doubt frequenting Olaa and Hilo and lower elevations on the Kau side. *Barypristus rupicola, Colpodiscus lucipetens, Colpocaccus hawaiiensis, C. apicalis, Atelothrus hawaiiensis, Mesothriscus hawaiiensis, Metromenus lentus, Mecyclothorax konanus, vulcanus, pele, bembidicus, Thriscothorax bembidiodes, paradoxus, discedens, variipes, Metrothorax deverilli, laticollis* and *Bembidium ignicola.*

The Staphylinidae are represented by a number of excessively minute, but remarkable, native species. They require very special search, if they are to be obtained in numbers, and the most careful mounting, when secured. Few of the species are much more than a millimetre in length and they are of very delicate build, and easily spoiled by rough handling. Probably the species are still more numerous in Olaa.

Histeridae are represented by only one or two minute species, but the Nitidulidae are well represented, one or two of the species being of remarkable structure and not surpassed in interest by any other island species. Probably there are eight or twelve to be found at Kilauea and others in Olaa.

Cucujids are as usual represented by a *Brontolaemus* and a *Laemophloeus*, the latter being rare.

Cioidae yield at least thirteen species of *Cis* and two of *Apterocis*. On my recent visit I took a single specimen of *Cis haleakalae*, described on a unique from Maui, a most interesting and unexpected capture.

Anobiidae are very numerous in individuals and the species are also numerous; in fact their extreme abundance is, as I have noted, a feature of the forest on the Kau side. Hundreds of specimens can be taken in an hour or two. The three genera, *Holcobius*, *Xyletobius* and *Mirosternus* are all represented, the two latter most numerously.

Elateridae are numerous in individuals and both *Itodacnus* and *Eopenthes* are found. The species are not yet described.

Eucnemids are less numerous, the large black *Fornax* on Koa trees being the most conspicuous and always attainable. With it the large Cistelid *Labetes hawaiiensis* is also always to be found.

Of weevils *Acalles lateralis*, *callichroma*, *melanolepis*, *tuberculatus*, and one or more undescribed species are all rare. None have been collected in Olaa, where other species must occur. *Dryophthorus squalidus*, *distinguendus*, and *peles* are the common Kilauea species; *gravidus*, *declivis*, *modestus* and *insignis* are found at lower elevations, though I have not noted them from Kilauea, nor should I have taken these common insects, had I seen them. *Pentarthrum prolixum* is abundant, and often very large; *Deinocossonus nesiotes* rare, *Nesotocus munroi* always attainable both at Kilauea and in Olaa. *Oodemas* requires special study, individuals being very abundant, but the species are as yet very imperfectly known, being excessively difficult to determine. Of the Scolytids several species of *Xyleborus* are found, and others again towards Hilo. It is especially desirable to obtain the rare males and associate them with their females, to which they bear no superficial resemblance. On my last visit I was able to take the sexes of two species in company.

The Longicorns of the genus *Plagithmysus* and *Clytarlus* are better represented than in any other locality in the islands. No less than a dozen species are to be found in the limits of a little over two miles of country, and a visit to Olaa may yield one or two other species. I discovered a new* *Plagithmysus* recently about half a mile from the Hotel, near the vegetable garden. The species are *P. vitticollis* (Kau side), *P. longulus* (Hilo side), *P. bishopi*, *P. bilineatus*, *P. perkinsi*, *P. varians*, *P. darwinianus*, *P. lamarckianus*, *P. sulphurescens*, *P. giffardi* and *P. gracilis* (which I believe is distinct from *P. bishopi*). Also *Clytarlus filipes*, *C. claviger*, and in Olaa *C. abnormis*.

Parandra puncticeps and *Aegosoma reflexum* are both common.

HYMENOPTERA.

About fifty bees and wasps are here named, mostly from the immediate neighborhood of the volcano, but I have added a few that are easily obtained in Olaa or near Hilo. It will be seen

*P. *giffardi* sp. nov. very closely allied to *P. sulphurescens* Sh., but at once distinguished by the entire absence of a basal fulvous or rufescent area on the elytra. It is attached to a species of *Myrsine*.

that the locality is very rich, more than one-fourth of all the Hawaiian Aculeata being found in this region. Each of the three localities that I enumerated and described at the beginning of this paper has its peculiar species. Where a species is restricted to, or is chiefly found in, one of these only, I have put the number of the locality after its name, where no number is given the species are generally distributed. *Nesomimesa hawaiiensis; Deinomimesa hawaiiensis* (2), *D. punae* (Olaa); *Xenocrabro hawaiiensis, polynesialis, atripennis, curtipes* (1), *fulvicrus* (Olaa); *Hylocrabro tumidoventris* var. *leucognathus; Nesocrabro rubrocaudatus* and var. *bidecoratus* (1); *Odynerus venator* (1 and 3), *erythrognathus* (2), *cyphotes, vulcanus, orbus* (2), *peles* (1), *sociabilis* (1), *scoriaceus* ? (1), *dromedarius* (1), *heterochromus* (2), *rubropustulatus, obscure-punctatus, dyserythrias* (2), *cyanopteryx* (2), *pterocheiloides* (1), *chelifer* (1), *nigripennis, newelli* (Hilo), *nilensis* (Olaa), *mesospilus* (Olaa), *cutretus* (Olaa); *Nesopresopis simplex* (1 and 3), *difficilis* (1), *volcanica* (1), *rugulosa* (1), *vicina* (1 and 3), *coniceps* (3), *dumetorum* (3), *specularis* (3), *crabronoides* (3), *inquilina* (1), *sphecodoides* (1), *pubescens, setosifrons, insignis* (3), *erythrodemas* (3).

The parasitic Hymenoptera are well represented by the usual Hawaiian types, and now also by a good many imported species. The finest species are the curious Ophionine, *Banchogastra nigri*, and the Pimpline, *Glyptogastra hawaiiensis*, both found in the fern forest. Ophions of various species and genera are extremely numerous, and often scores of individuals may be seen resting under a single large leaf, while frequently a regular swarm flies off, as one disturbs the dead fronds of the large tree-ferns.

LEPIDOPTERA.

The Lepidoptera are probably the most richly represented of all the Orders of insects at Kilauea, the great number of species that frequent Olaa coming up to within a mile or two of the crater. I will merely mention some of the more interesting species. *Deilephila pyrias*, particularly common in Olaa, is frequent, and its caterpillar is often met with on forest trees, *Euphorbia, Bobea* and others, being polyphagous. A beautiful *Plusia*, of which I have drawn up a description under the name of *P. newelli*, after its discoverer, Brother Matthias Newell, of

Hilo, is closely allied to the remarkable Tantalus species, which I specially noticed in last year's address on the insects of that mountain. The giant species of *Scotorythra* are common, and the still larger *Acrodrepanis* occurs on the Olaa side. Six out of eight of the native species of *Leucania* occur, and all of the most remarkable species. Species of *Scoparia* are a feature of the locality being extremely numerous, as also are individuals of several species of *Orthomecyna* and *Mestolobes*. Many other nice Pyralidina are conspicuous, species of *Margaronia*, *Omiodes*, *Phlyctaenia*, *Talis* and the remarkable *Hyperectis*, while a Pterophorid swarms amongst the *Vaccinium*. Tineina are in profusion at certain (and irregular) seasons, and a number of large species of Tortricina occur, but the latter are generally scarce. The Microlepidoptera require special collecting. They should always be killed with ammonia and pinned in the field on silver wires, directly they are caught. I shall not attempt to draw up a list of species of this Order, which would be of great length, the genera *Agrotis*, *Leucania*, *Scotorythra* and *Scoparia* including many species. The butterfly *Pyrameis tameamea* is very abundant and very variable in color on the underside, while the little blue, *Lycaena blackburni*, swarms on the bushes of *Dodonaea viscosa*, on which the caterpillar feeds.

DIPTERA.

The flies are represented by numerous endemic species, mostly very small and obscure forms. The Drosophilidae and Dolichopodidae include most of these, and they are probably still more abundant at lower elevations in Olaa. Most conspicuous are the Sarcophagid flies of the genus *Dyscritomyia* and *Prosthetochaeta*. They may be seen buzzing round the herbage or shrubs in a very Tachina-like manner and in fact often in company with these parasites. Their habits are yet unknown. I had long supposed them to be parasitic on cutworms, but the discovery by Mr. Terry, that they produce living maggots of large size, makes this supposition less probable. The fact that they often frequent the driest and most arid localities, where there is little or no decaying vegetable matter, and that, in other places where such matter exists, one does not find fly maggots therein, that could produce these large species; the further fact that animal matter under natural conditions in the islands was necessarily almost

wanting, there being only birds to supply this, makes the problem a puzzling one. In spite of this, the species of these flies are numerous, the individuals sometimes abundant, so much so as to furnish the food supply for the larvae of various Hawaiian Crabronidae.

Five species of *Pipunculus* (parasitic here on Delphacid leaf hoppers) are known to me from Kilauea, and several of *Cacnosia*, and these with the groups previously mentioned, as well as species of *Lispe*, *Asteia*, *Tephritis* and *Sarcophaga* complete the Dipterous fauna.

Throughout this paper I have used generic and specific names, as published in the "Fauna Hawaiiensis," so that it has not been necessary to cite the authors. In the Hymenoptera I have used the genera proposed by me subsequently for the genus *Crabro* of that work.

Papers.

On Some Peregrine Aphidae in Oahu [Hem.]

By G. W. Kirkaldy.

With the exception of certain Chermidae, all the Sternorrhynchous Homoptera yet observed in the Hawaiian Archipelago appear to be recent arrivals. As is natural in families so little studied till lately, many of the species cannot be identified with any of those already described from other Faunas and consequently their endemic habitat remains unknown. I now enumerate four Aphidae occurring near Honolulu; about six more are known to me, but as they belong to obscure genera with many, poorly differentiated species, I have not yet positively determined them, and must leave them for a future communication.

Several of these species are of considerable economic importance, *Myzus citricidus* doing much damage to Orange trees, whilst *Aphis sacchari* is a pest of Sugar-cane.

Aphis Linnaeus.

1758 Systema Naturae, Ed. 10, p. 451.

1. **sacchari** Zehntner.

Aphis sacchari Zehntner 1897 Arch. Java Suiker. V. p.? and 1901 op. c., IX (sep., p. 1) Pl. I f. 1-10; Krüger 1899 Das Zuckerrohr und seine Kultur 313.

This is the "Sugar-Cane Aphis," which is found in Java and Hawaii, wherever cane is grown. The following enemies attack it here:

Diptera: *Xanthogramma grandicornis* and *Leucopis* sp.

Coleoptera: *Coccinella repanda* and *abdominalis; Scymnus notescens* and *vividus*.

It is visited and milked by *Pheidole megacephala*.

The following attack it in Java:

Hymenoptera: *Aphelinus mali* cf. Zehntner Pl. 2 f. 21; a sp. of Encyrtinae, f. 22-24.

Neuroptera: *Chrysopa* sp. and *Osmylus* sp.

Diptera: a Syrphid, Pl. 2 f. 17-20.

Coleoptera: a Coccinellid, Pl. 1 f. 11-16.

Zehntner has figured the *Aphis*, its metamorphoses and enemies.

N. B. An *Aphis sacchari* from the Antilles was mentioned by an anonymous writer in 1833 in Loudoun's Magazine of Natural History, VI, 407-9 (with appendix by Westwood 409-13), fig. 54, and it might be thought that Zehntner's name was invalid. The Grenadan insect, however, was not described and was confused with the Asiracid *Stenocranus saccharivora* (Westwood), the drawings actually being those of the latter. I think, therefore, that Zehntner's name is not preoccupied and can stand.

Macrosiphum Passerini.

1860 Gli aphidi 27.

1. **rosae** (Linne).

Aphis rosae Linn. 1758 op. c. 452.

This widely distributed form is found on cultivated roses in these islands; it occurs in my own garden. It is attacked by:

Diptera: *Xanthogramma grandicornis*.

Coleoptera: *Coccinella repanda* and *Orcus chalybeus*.

Myzus Passerini.

1860 Gli Aphidi 27.

1. **citricidus** n. sp.

Form and general appearance of *M. cerasi* Fabr. Black, shining, closely reticulate on the tergites; 4th and 5th segments of the antennae largely whitish; eyes blackish; rostrum whitish, last segment and a cloud on the penultimate darker. Venation pale fuscous, the longitudinal vein and the stigma whitish, sordidly. Coxae and the base of the fore femora whitish, the tibiae whitish, except apically. Abdomen above and below often widely dark brownish, medio longitudinally, (blackish in certain lights).

Vertex broad, not prominent anteriorly; no capitate hairs on the head. Antennae attaining to about the middle of the cornicles; (2-tubercles) 4, 2½, 16, 16, 11½, 6, 26, tubercles far apart; frons convex, not sulcate. Rostrum reaching to hind coxae. Style longer than hind tarsi, hairy. Cornicles longer than the 4th segment of the antennae, slightly tapering, mouth oblique, more than twice as long as style.

Length of body 1⅝-1¾ mill., expanse of flight organs about 5¼-5½ mill.

The above description is taken from living winged females; the apterous adult is similar, the form being that of *M. cerasi;* I have not seen males. I cannot identify this species with any described *Myzus*, and it cannot be the "Orange Aphis" of North America, as that is described as a *Macrosiphum* (*citrifolii*), dark green, with garnet-red eyes. The young of *Myzus citricidus* are brown, while those of *Macrosiphum citrifolii* are said to be light yellowish-green or rusty-green.

Myzus citricidus is probably an introduction from China, and is very common on Citrus all over the Hawaiian Islands. It is not parasitized here, so far as I know, and immediately the young Orange shoots appear, they are covered by this pest. It is, however, preyed on by a number of insects, which very soon make a clean sweep of it; these are as follows:

Neuroptera: *Chrysopa microphya* and *Anomalochrysa biseriata.*

Diptera: *Xanthogramma grandicornis.*

Coleoptera: *Coccinella repanda* and *conformis; Cryptolaemus montrouzieri; Platyomus lividigaster; Scymnus notescens; Coelophora pupillata* and *Rhyzobius ventralis.*

Hemiptera: *Zelus peregrinus*, but not often.

Mr. Terry tells me these Aphids have a decided Citrus taste.

Myzocallis Passerini.

1860 Gli Afidi; Schouteden 1906 Mem. S. E. Belg. XII. 211.

kahawaluokalani sp. nov.

Winged Female:

Pale yellowish, marked with pale brownish fuscous, principally as follows: head dorsally with a mediolongitundinal line and a speck on each side of this, and lateral margins broadly, posterior margin narrowly; irregular, broad submedian bands down the pronotum, lateral margins narrowly; a suboval, interiorly pale, sublateral spot on mesonotum, a goblet-shaped mark in the middle (the bowl anteriorly, the stem posteriorly), posterior margin broadly; a large irregular transverse spot near the base of abdomen; antennae whitish, first two segments and apices of 3rd-5th pale brownish fuscous. Eyes bright pale vermeil. Abdomen dorsally

and sublaterally with numerous fuscous-ringed tubercles which bear scarcely perceptible hairs, with 2 contiguous fuscous mammiform tubercles near the base in the middle, etc. Tegmina hyaline, very strongly particoloredly iridescent, subcostal ('costal') cell and stigma, veins and a V apically, pale fuscous. Legs pale, fore and middle femora with a fuscous annulation, hind femora broadly fuscous apically, hind tibiae fuscous basally; coxae more or less fuscous. Honeytubes short, pale fuscous. Antennae scarcely as long as body, 6, 5, 30, 24, 22, 14, 12, the seventh not really separated from the sixth. Stigma rather long, longer than broad, curved. Length to apex of abdomen about 1.25 mill., to apex of flight organs about 2 mill.

Hab. Oahu, Honolulu, on *Lagerstroemia indica* an introduced plant (G. W. K.); also on other shrubs.

Nymph: pale yellow, eyes red as in adult. Head, nota and abdomen multituberculate dorsally and laterally, each tubercle with a black, capitate bristle.

This species agrees with *Monellia* in that it carries its organs of flight horizontally while walking and in repose, but its structure is that of *Myzocallis*.

On Two Hawaiian Thysanoptera.

By G. W. Kirkaldy.

No Thysanoptera have yet been described from the Hawaiian Islands; a large number were, I believe, collected by Dr. R. C. L. Perkins for the Hawaiian Exploration Committee, but they have apparently not been yet worked out.

Agnostochthona gen. nov.

Belongs to the Tubulifera and differs from *Anthothrips* Uzel by the vertex being very slightly longer than wide anteriorly and slightly though distinctly wider anteriorly than posteriorly; it is also longer than the pronotum medianly. Face elongate, angularly rounded at the apex, reaching nearly to the base of the prosternum. First segment of antennae as long as, or longer than, the second, and is much stouter; third and fourth a little wider than the others. Tegmina not constricted medianly. Spine on the fore tibiae somewhat large in the female.

1. alienigera sp. nov.

Sordid yellowish-brown, dark fuscous on head and pronotum and on 6th-8th, antennal segments. Eyes rounded, not protruding. Ocelli widely separated, large, posterior pair contiguous with the internal margin of the eyes, front one almost between first segments of the antennae, which are subcontiguous. Relative lengths (from base) 6, 6, 8, 10, 8, 8, 6, 5; 3rd 6th, basally subpedicellate; hairs moderate. Postocular bristles very long, one on each side. Cheeks without bristles. Pronotum roundly emarginate apically, rounded posteriorly, lateral margins distinctly diverging

posteriorly, posterolateral angles rounded. Fringe-hairs of wings simple, long. Abdominal bristles sparse, slender, mostly large.

♀ Tube about one half longer than the preceding segment.

Length about 1¾ mill.

Hab: Oahu, Mt. Tantalus, 1500 feet, under bark of dead tree, in numbers and in all stages (F. W. Terry).

Nesothrips gen. nov.

Allied somewhat distantly to *Liothrips* Uzel. Flat above, convex below. Strongly chitinized, with a shining, polished surface.

Head dorsally about as long as the pronotum, a little longer than wide, lateral margins subparallel. Antennae about twice as long as head, Ocelli present. Eyes not very prominent laterally. Face long, lateral margins subparallel, then narrowing apically. Pronotum anteriorly as wide as the head, posteriorly distinctly wider, warts absent. Flight-organs absent. Anterior legs unarmed, femora incrassate, more than twice as long as the tibiae.

1. **oahuensis** sp. nov.

Polished, shining, pitchy-blackish; apices of anterior tibiae, the tarsi etc., paler. Face bristles absent. Antennae 5, 5, 9, 8½, 8, 6, 8. Two longish bristles (lateral and sublateral) near the posterior margins of at least five tergites.

♀ Tube with 2 terminal bristles.

Length 1⅔ mill.

Hab: Oahu, Mt. Tantalus, 1300 feet (O. H. Swezey) probably on flowers.

On Two New Vitian Chermidae [Hem.]

By G. W. Kirkaldy.

So far as I am aware, no Vitian Chermidae have yet been described. Mr. F. Muir recently, in collecting and studying leafhoppers and their parasites in that group of Islands, secured two species of the genus *Trioza*.

Trioza Foerster.

1. **vitiensis** sp. nov.

♀. Vertex obscure testaceous with a narrow blackish brown line down the middle and an obscure spot on each side at the base between this line and the ocelli. Frons orange, the middle ocellus pale yellow, ringed with blackish-brown, the others at the posterolateral angles of the vertex and conspicuously orange. Antennae pale yellow. Eyes red brown. Pronotum, dorsulum and mesonotum pitchy, with the following yellowish-ferruginous marks; dorsulum with a median and a curved lateral line. Mesonotum with 4 lines, the inner curved inwardly, the outer curved outwardly; scutellum pale with a black median line, abdomen black, genital segment

yellowish. Tegmina and wings byaline, veins pale fuscous. Legs yellowish brown, femora basally more or less piceous. Vertex flat, transverse, foremargin truncate, mediolongitudinally narrowly sulculate and shallowly pitted on each side nearer the base. Head nearly as wide as thorax, frontal cones rounded apically. Pronotum scarcely as wide as vertex, very short. Dorsulum longer than wide, suboval, narrower than the mesonotum, which is transverse. Scutellum small. Tegmen about $2\frac{3}{4}$ times as long as wide in form like that of *T. koebelei* Kirkaldy and with similar venation, except that the brachial (lower branch of cubital) forks basal of the middle.

♂ largely orange yellow. Head dorsally yellow cinereous with a line down the middle as in the other sex. Cones bright orange. Nota orange brown, rather feebly lined with fuscous and yellow brown. Tegmina and legs as in the ♀, but the veins of the former yellower. Abdomen ferruginous, last tergite deeply excavated apically, wavily reflexed, the reflexed part creamy; genital segment diamond shaped.

Length to apex of abdomen $2\frac{3}{4}$ mill.; to apex of tegmina folded $5\frac{1}{8}$ mill.

Hab. Viti, Rewa (III 06. Muir 1 ♂ 2 ♀ ♀).

2. **vanuae** sp. nov.

♀ yellowish, abdomen (except genital segment) black. Head dorsally with a very slender black sulculation, ocelli orange red. Pronotum very transverse, obtuse-angularly emarginate posteriorly, very narrowly margined there with black. Dorsulum about as long as mesonotum and scutellum together, scarcely longer than wide. Tegmina in form like *T. vitiensis*, hyaline, veins yellowish fuscous, venation like that of *T. koebelei* but the median (upper branch of cubital) forks close to the apex of the tegmen.

Length $1\frac{7}{8}$ (to apex of abdomen) and 4 mill. (to apex of tegmina folded.)

Hab: Viti, Rewa, (III 06. Muir, 1 ♀).

An Extraordinary Leaf-hopper from Mt. Konahuanui, Oahu.

By Otto H. Swezey.

Dictyophorodelphax gen. nov.

This aberrant genus of Delphacidae is erected for a single species discovered on a southern ridge of Mt. Konahuanui, Oahu, February, 1906. The genus is chiefly distinguished from other genera of Delphacidae by the extremely long, narrow, forward prolongation of the head giving it a superficial resemblance to *Scolops*, or some others of the Dictyophorinae. Its position in Delphacidae is determined by the presence of a movable spur at the apex of posterior tibia.

The prolongation of the head is as long as the rest of the insect. It is narrow and tapers gradually to a blunt apex. It has a median carina ventrally; two lateral carinae, the ventral

one terminating about two-thirds the distance from the base, the dorsal one not quite reaching the apex; two carinae on dorsal surface extending full length, a slight short median carina between the eyes. The clypeus has median and lateral carinae corresponding with those of ventral side of prolongation of head. Antenna has second joint cylindrical, longer than first, and well supplied with sense organs. Head narrower than thorax. Pronotum has three carinae, the lateral ones straight, diverging and reaching the posterior margin; carinae of scutellum similar to those of pronotum. Posterior tarsi shorter than their tibiae.

Dictyophorodelphax mirabilis sp. nov.

Length from apex of prolongation of head to apex of abdomen 8 mm.; prolongation 4 mm. Testaceous; clypeus and apex of rostrum black; eyes dark drown, very little excavated below; black line on anterior of first segment of antenna, brown spot on cheek below antenna; prolongation of head with the outer two-fifths bent slightly downward, blunt at apex, carinae with black line on edges and hairy along their bases. Pronotum and scutellum brown outside of lateral carinae; abdomen with brown markings on sides of segments. Tegmina pale testaceous, nearly transparent, oblong, not quite reaching the apex of abdomen; veins with scattered dark brown dots, a series of dark brown spots on termen between veins, an elongate spot on costal margin, and also on sutural margin but a short distance from termen, the one on sutural margin the longer and farther from termen; wings absent.

Femora and tibiae lineated with dark brown or black; anterior and intermediate tibiae black-ringed near apex; anterior and intermediate tarsi; brown, black at apex; posterior tarsi brown at apex of first segment, black at apex of last segment. Calcar at apex of posterior tibia about three-fourths length of first segment of tarsus, 7 to 8 teeth, these and the two spines on outer side of tibia at apex of tibiae and at apices of first and second joints of tarsi black-tipped. Anal tube large, style small, included. Ovipositor pale. Pygofers of male truncate, with a large ventral notch; styles broad, laterally compressed, near together, their tips very slender and bent upwards nearly at right angles and curved forward a little, slightly diverging, dark brown.

Two males and two females of this species were swept from

the stunted bushes and ferns, at an elevation of about 2500 feet, along the path on the southern ridge leading up to the summit of Mt. Konahuanui, Oahu. On account of the general sweeping by the insect net, when these were caught, it was impossible to determine their food-plant. It is hoped that at some future time further observations may be made at this same locality and more learned of this remarkable insect.

Life History and Notes on the Pink-winged Tryxalid (Atractomorpha crenaticeps Blanchard).

By Otto H. Swezey.

This grasshopper is a somewhat recent arrival to the Hawaiian Islands. It probably came from Australia, as it occurs there and also in New Guinea. It has been seen in and around Honolulu for several years, and is probably generally spread thruout Oahu; but has not as yet been seen on the other islands of the group. It has not as yet become much of a pest, altho it is strictly a vegetable feeder. It is not, however, a grass feeder particularly, but feeds upon most all kinds of garden plants and weeds, without much particular choice.

This species is dimorphic as regards color, there being a green form and a grey form. This applies to both sexes. Probably the numbers of each form are about equal; but locally sometimes one form is the more numerous and sometimes the other. This dimorphism appears as early as the second instar of the nymph; but is not constant thru the succeeding instars; as there may be several changes before the final molt. This is shown in the following table, which is the record of nymphs that were captured of various ages and reared to maturity:

DIMORPHISM OF NYMPHS.

2nd instar molted		3rd instar molted		4th instar molted		5th instar molted		adult
grey	Oct. 7	grey	Oct. 17	green	Oct. 26	green	Nov. 12	grey male
green	Oct. 22	grey	Nov. 1	green	Nov. 12	green	Nov. 26	grey male
						grey	Nov. 8	grey male
						grey	Dec. 5	grey female
				green	Dec. 8	green	Jan. 2	grey female
		green	Dec. 28	green	Jan. 18	green	Feb. 10	grey female
grey	Nov. 15	grey	Dec. 19	grey	Jan. 19	grey	Feb. 22	grey female

Life-history: A female of the grey form deposited a batch of 8 eggs, Dec. 28, 1905. They were inserted in soil, in a cylindrical mass about 12 mm. long by 4 mm. in diameter, held together by a yellowish brown, dried frothy material. The eggs are 4 mm. long by 1 mm. thick, cylindrical with rounded ends, finely reticulated, and of a dull testaceous color. One female under observation deposited four clusters of 27, 28, 36 and 38 eggs respectively. Of the first lot of these, the first egg to hatch was Feb. 13th; four more hatched Feb. 15th, giving 47-49 days for the egg-stage. Three of these were reared to maturity. Observations were interrupted so that the time of all the molts was not observed, but their number was determined by the counting of exuviae in the breeding jar: five times for the males and six times for a female. The period between molts has been observed to range from 10 to 20 days.

The freshly-hatched nymphs were 5 mm.; green, dotted and marked with white; anterior and intermediate legs grey-spotted. (In subsequent lots of 37 and 14 freshly-hatched nymphs, all were of this same coloration). The first molt occurred after 17 days, and then the nymphs were green, the anterior and intermediate legs green like the posterior ones. They remained green thruout their subsequent stages. Two matured to green males, May 24 and May 25 respectively; and one matured to a green female, June 6. This gives about 100 days for the nymphal period of the male, and about 112 days for the female. This may be longer than it would have been in a state of nature; as the conditions of the breeding jar may not have been at all times the most favorable for growth and development. The egg-stage plus the nymphal stage gives about five months from egg to maturity.

The Literature of 1906 Dealing With Hawaiian Entomology.

By G. W. Kirkaldy.

1. Craw, A: "Report of the Division of Entomology for the Year Ending December 31, 1905," 2 Rep. Agr. For. Hawaii, 99-166, figs. 1-11 and Plates VII-VIII (including subreports by J. Kotinsky) (Oct. 13).
2. Higgins, J. E.: "The Mango in Hawaii," Bull. Hawaii Agr. Sta. XII, 1-32, Plates I-X.

Brief Notes on Insects, p. 24 Pl. III f. 3.

3. Kellogg, V. L.: "Yellow Fever and the Panama Canal," Science, n. s., XXIII, 114. (Jan. 19).

Deals with *Stegomyia fasciata* in Hawaii.

4. Kirkaldy, G. W.: "Random Notes on the Entomology of the Lowlands of Oahu," Proc. South London Ent. Soc. 1905-1906, pp. 17-18.

5. id.: "Brief Note on Hawaiian Butterflies," Entom. XXXIX 138-9 (June).

6. id.: "Leafhoppers and Their Natural Enemies, Part IX Leafhoppers—Hemiptera," Bull. H. S. P. A., Ent. I 269-479, Plates XXI-XXXII (Feb. 3).

Deals inter alia with *Perkinsiella saccharicida.*

7. Knab, F.: "The Yellow Fever Mosquito," Science n. s. XXIII 270-1 (Feb. 16).

Danger to Hawaii from *Stegomyia fasciata.*

8. Kotinsky, J.: "History of Economic Entomology in Hawaii," Bull. U. S. Ent. LX, 58-66 (Sept. 22).

9. id.: "Preliminary Notes on Lantana Insects in Hawaii," Proc. Haw. Livestock Breeders' Asso., 69-78, figs. 3-8.

10. id.: "Hornfly and Its Parasites in Hawaii," op. c., 78-80, f. 9. See also Craw.

11. Leonardi, G.: "Generi e specie di Diaspiti. Saggio di Sistematica delle Fioriniae," Redia III 16-65, figs. 1-22 (Jan. 26).

Fiorinia fioriniae 32-6, f. 11.

12. Nörgaard, V. A.,: "Division of Animal Industry, Report for 1905," 2 Rep. Agr. For. Hawaii, 167-228 (Oct. 13).

Compsomyia macellaria 212-8; *Haematobia serrata* on sheep, 211–2.

13. Perkins, R. C. L.: "Leafhoppers and Their Natural Enemies. Part VIII Encyrtidae," etc., Bull. H. S. P. A. Ent., I 239-67, Plates XVIII-XX (Jan. 6)," Part X Dryinidae, Pipunculidae Supplement," op. c., 481-99, Plates XXXIII-XXXVIII (Mar. 1) and "Introduction," op. c., p. I-XXXII, 8 figs. (May 1).

14. Van Dine, D. L.: "The Avocado Mealy-bug (*Pseudococcus nipae* Mask.)", Press Bull. Hawaiian Agr. Sta., XVI, 1-12, figs. 1-3 (Jan. 13).

15. ID.: List of Insects on p. 16 of J. G. SMITH's "The Black Wattle (*Acacia decurrens*) in Hawaii," Bull. Haw. Agr. Sta. XI, 1-16.

16. ID.: "The Mango-weevil (*Cryptorhynchus mangiferae* Fabr.) op. c., XVII 1-11, Plates I-II (Aug. 14).

Also numerous articles and notes in

(*a*) The Hawaiian Forester III ex. pp. 1-422 (Jan.-Dec).

(*b*) Proceedings of the Hawaiian Entomological Society pp. 1-36, Plates I-II (Ap. 3) and 37-78 (Dec. 1st.)

Reviews of the entomological work done in Hawaii have appeared in

(*a*) Canadian Entomologist XXXVIII, 148 (May).

(*b*) Zeitschrift für Wissenschaftlichen Insektenbiologie II 66-70 (Mar. 6) and 126-7 (May 15).

(*c*) Entomologist XXXIX 168 (July), 216 (September) and 283-6 (Dec.).

(*d*) Experiment Station Record XVII 477 (Jan.) and vol. XVIII.

(*e*) Nature LXXXV 82 (Nov. 22).

(*f*) Zeitschrift für Pflanzenkrankheiten XVI 296 (Dec. 1)

(Omitted from 1905).

REUTER, O. M.: "Capsidae stalianae," O. F. V. F. XLVII No. 12, pp. 1-20.

p. 2, *Hyalopeplus pellucidus.*

After the reading of the foregoing papers, the following officers were elected for the ensuing year:

President..... Mr. W. M. GIFFARD
Secretary and Treasurer.....MR. J. KOTINSKY
Other members of the Executive Committee.....
.....MR. G. W. KIRKALDY AND MR. F. W. TERRY

The President, on being inducted into the chair, appointed MR. O. H. SWEZEY as *Vice-President.*

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

I

PART 4

(With Plate and Text Figures)

HONOLULU, OCTOBER, 15, 1907

PRICE, 50 CENTS

Smithsonian Institution
FEB 15 1910

Hawaiian Entomological Society

Founded 1905

List of Officers for 1907.

President.....W. M. Giffard
Vice President.....O. H. Swezey
Secretary-Treasurer.....J. Kotinsky
Members of Executive Committee.....F. W. Terry, G. W. Kirkaldy
Editors of the Proceedings for 1906–1907.....G. W. Kirkaldy, O. H. Swezey

MEMBERSHIP

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Chambers, W. E.
Cobb, Dr. N. A.
*Craw, A.
Davies, T. C.
Davis, E. H.
Deering, C. W. C.
*Eckart, C. F.
*Giffard, W. M.
*Hosmer, R. S.
Jordan, G. A.
*Kirkaldy, G. W.
*†Koebele, A.
*Kotinsky, J.
Muir, F.
†Newell, Bro. Matthias
Paxton, E. E.
*Perkins, Dr. R. C. L.
Peterson, Miss M.
*Swezey, O. H.
*Swezey, Mrs. O. H.
Tenney, E. D.
*Terry, F. W.
*Van Dine, D. L.
Weinrich, Jr., W.
Weinrich, Jr., Mrs. W.
Wilder, G. P.

* Original. † Honorary.

JANUARY 3rd, 1907

The twenty-fourth regular meeting was held in the Entomological Laboratory of the H. S. P. A. Experiment Station, Mr. Giffard in the chair.

Member elected: Mr. G. A. Jordan.

NOTES AND EXHIBITION OF SPECIMENS.

Dr. Perkins exhibited a number of aculeate Hymenoptera from the Hawaiian Isles and Australia, and made remarks thereon.

(i) *Prosopis.*

About a score of species of this genus and allied forms from Australia were exhibited. Dr. Perkins emphasized the great variety of habitus and structure of these Australian forms as compared with the fifty or more distinct Hawaiian species he had separated from *Prosopis* under the name of *Nesoprosopis.* The latter were in general of very uniform and inconspicuous appearance, and none of the Australian species at all resembled them structurally.

The brightly metallic Australian species, those with bright yellow thoracic markings and red abdomen, and the conspicuous forms, had no analogy with the Hawaiian series. Australia also yielded the extraordinary black and yellow wasp-like genus *Hylaeoides,* which not only exactly reproduced the appearance of some Australian wasps, but even had the very remarkable structure of the second ventral segment shown by some of these.

"Very similar to the metallic true *Prosopis* of Australia is a series of metallic species which form a new genus of bees, allied indeed to *Prosopis,* but with an acutely lanceolate tongue and indicating a direct origin of a sharp-tongued bee from an obtuse-tongued one. This genus is therefore of great interest as it connects the two distinct series of bees—the Obtusilingues and Acutilingues.

Another extraordinary new genus allied to *Prosopis* is an insect so like to some fossorial wasps that it would hardly be recognized as a bee at all without careful examination, but might be suspected of being an abnormal Pemphredonid or Crabronid, the general form and incrassate head resembling these wasps. It is, however, a true bee and not even a parasitic

species, as are some of our red and black Hawaiian *Nesoprosopis,* since the curved sweeping hairs of the front legs are well developed and have noticeably dilated, or spatulate, apices.

I should have said above, that, as conjectured by Cockerell, F. Smith must have, by confusion, dissected some wasp in mistake for the wasp-like *Hylaeoides* above referred to, since his figures of the mouth-parts are those of a wasp and not like those of this bee, which I have myself dissected."

(ii) *Lithurgus.*

Dr. Perkins then exhibited an anomalous *Lithurgus,* and made the following remarks:

"The bee here exhibited is one of the Megachilidae and is a comparatively recent introduction into the Hawaiian islands. The first specimen taken was caught by Mr. Marlatt of the Department of Agriculture at Washington, when in company with Koebele and myself at Waialua, I think in 1900. On this occasion we took plenty. If the characters given by Ashmead and others for the genera of this family be considered adequate and correct, then this bee constitutes, I believe, an undescribed genus, or it may be considered as a species of *Lithurgus* sens. lat. Ashmead states that European *Lithurgus* have no pulvilli, while other American writers state that American species described under the genus have a pulvillus at least in the male and a new genus has been described for one of these. This species, however, is said to have 3-jointed labial palpi. The Hawaiian insect has 4-jointed labial palpi, its mandibles are *Lithurgus*-like, 3-dentate at apex, and there is a pulvillus at least in the male. Its other oral characters are not at all *Megachile*-like. Its maxillary palpi are 4-jointed not 2-jointed. (Ashmead, however, gives *Megachile* 4 joints to these organs!) The tongue is not folded so as to merely lie beneath the head in repose, but is extended straight-back along the sternum, which is channeled for its reception, while the labrum is much less long than in *Megachile* and projects very little backward from the clypeus."

(iii) *Odynerus.*

Dr. Perkins then read some remarks on the "Habitus and Structure of Australian *Odynerus* and Allies compared with those of Hawaii."

Some thirty species of Australian *Odynerus,* or closely allied forms, were exhibited, showing the great variety of appearance and bright colours as compared with the remarkably general *blackness* of the Hawaiian species. The variety of structure was also large. A few typical *Odynerus* of other countries were also exhibited, and Dr. Perkins remarked on the necessity of the study of exotics; with the study of a few *Prosopis* and *Odynerus* one knows all the Hawaiian species.

In a discussion on the habits of aculeate Hymenoptera, Dr. Perkins, in reply to Dr. Cobb, stated that the caterpillars, stored up for the food of the larvæ, were put through a process of stinging and malaxation. Dr. Cobb had never observed the caterpillars to be dead or even injured. Mr. Swezey stated that sometimes the caterpillars are so insufficiently paralized as to pupate, and even crawl about after being stung. The larva of the bee is hung up in the cell and feeds by descending onto the caterpillar.

Dr. Cobb observed that the drawing of insects was more desirable when from living specimens. He had found that he could paralyze them by means of bee stings; while a wasp's sting would kill an insect, the Odynerus sting would only paralyze. He had produced paralysis in Diptera by either inserting the bee sting poison on the point of a needle in the neighborhood of the thoracic ganglia or by presenting the same parts of the specimen to the bee-sting directly. An insect so stung retained its natural color and position ideally for drawing.

Mr. Swezey stated that he never was severely stung by *Odynerus* in all his handling of them.

Mr. Giffard exhibited specimens and presented the following notes:

1. *Calandra* (?) sp. (Introduced) 1 specimen.

Taken on October 14, 1906, from the base of a new pseudobulb of *Phalaenopsis amabilis* imported from the Philippine Islands during month of October. Larva of above also seen in the same plant.

2. *Calandra remota* (Hawaiian) 6 specimens.

Taken on October 20, 1906, at 1000 feet elevation on Tantalus in decaying stems of banana (*Musa cavendishii*). 20 specimens in all taken.

3. *Brachypeplus guttatus* (Hawaiian) 6 specimens.

Taken on October 1 of 1906 at 1300 feet elevation on

Tantalus in exudation on *Acacia koa*. This species is not common. In all 18 specimens were taken, including larvæ

Mr. Swezey exhibited specimens and presented the following notes: Since the beginning of the rainy weather in December, vegetation has sprung up luxuriantly in the dry district of Kaimuki, where everything appeared dead on the unoccupied land. Amongst the revived vegetation are tangles of the "morning glory," (*Ipomoea tuberculata*) growing over Lantana and other bushes, and on stone walls. At the present time the caterpillars of *Sphinx convolvuli* may be seen in hundreds and they have nearly stripped the leaves from the vines. They are of all sizes from young to full grown; and they vary in color from nearly uniform green to nearly uniform black with a close series between, in most of which the characteristic pattern for the species shows. Harrison G. Dyar has described the green form and the brown form in Entomological News, VI, p. 95-96, 1895. In this no mention is made of other variations; but Poulton in Trans. Ent. Soc. London, p. 515-554, 1888, gives full details of life history, and variations of caterpillars, illustrated with two plates.

Dr. Cobb remarked that at one time he found his morning glory and sweet potato vines were eaten by these caterpillars. At his suggestion they were offered to his chickens but they refused to eat them; after a slight starvation they ate them quite readily and he got rid of them by feeding them to the fowls. Mr. Swezey thought that these caterpillars were an exception to the rule in that he had so far bred no parasites from them; Dr. Perkins replied that while the grown caterpillars were not parasitized, the very young stages were heavily so. The native species of the same group were badly killed by *Tachina* and *Echthromorpha*.

FEBRUARY 7th, 1907

The twenty-fifth regular meeting was held in the Library of the Board of Agriculture and Forestry, Mr. Giffard in the chair.

Under miscellaneous business, the Secretary read a communication from the President in which he announced the generous contributions, towards a *Publication Fund,* by the following firms:

W. G. Irwin & Co., Vice-President, W. M. Giffard	$ 25.00
Alexander & Baldwin, Acting Manager, E. E. Paxton.	25.00
H. Hackfeld & Co., Vice-President, W. Pfotenhauer.	25.00
Castle & Cooke, Vice-President, E. D. Tenney	25.00
T. H. Davies & Co., Director, T. C. Davies	25.00
C. Brewer & Co., Treasurer, E. F. Bishop	25.00
Schaefer & Co., President, F. A. Schaefer	25.00
Bishop & Co., President, S. M. Damon	25.00
A total of	$200.00

The thanks of the Society were extended to the President for his efforts in making this collection in behalf of the Society. and the Secretary was instructed to send to each of the contributors a letter of thanks and a set of the Society's Proceedings as far as published.

The two amendments to the Constitution presented at the December meeting were voted upon and carried.

NOTES AND EXHIBITION OF SPECIMENS.

Mr. Wilder was glad to be informed by Mr. Craw that the scale bug recently collected on his mango trees was not *Coccus mangiferae* as originally supposed. Mr. Kotinsky stated that while this scale insect was found on mango trees purchased in the Moanalua Gardens, it was not found in Mr. Wilder's yard. The *Coccus* observed on trees other than of Moanalua-origin proved to be *Coccus acuminatus.* As regards the white "cottony" or "felty" scale on the Indian Mango trees in Moanalua, while Mr. Kotinsky was inclined to group it in the *Diaspidinae,* Mr. C. L. Marlatt of the U. S. Bureau of Entomology, in a recent letter, unhesitatingly called it *Odonaspis* sp., and Mr. E. E. Green believed "that it will more probably fall within the Dactylopiines." A study of the early stages is doubtless necessary to the elucidation of the problem, but this will have to be done from the material on hand as all the known plants infested with it were fumigated and the insect probably exterminated.

Mr. Kotinsky exhibited a specimen of *Danais plexippus,* the legs of which were encircled and held fast by the tendril of a cucurbitaceous vine. When discovered the insect was dead, and was being attacked by ants. There was no means of ascertaining whether the butterfly died a natural death, or was caught and held fast in the clutches of the tendril while resting over night.

Notes on Moth-Flies. [Psychodidae, Diptera]

BY MRS. OTTO H. SWEZEY.

During the past month these came in swarms to our lights at night, to be swept up by thousands the following morning. They made us very uncomfortable, as we were very apt to inhale them thru the nose, or swallow them while talking or eating. They persisted in coming for so many nights that I became curious to learn why they so suddenly appeared to spoil our peaceful evenings. Not only were we personally annoyed but they persisted in falling into the food, getting into the refrigerator by the dozens and into any food there which remained uncovered.

They were finally discovered in all stages in a jar containing rotting vegetation and "frass" left from the rearing of caterpillars.* An examination of the larvae and pupae makes an interesting comparison with the same stages of other species of the same family. Little is known of the life history of the Psychodidae, the family to which the moth-flies belong. They are of the smallest of the Diptera. They are called moth-flies on account of a slight resemblance to minute moths. This is due to the hairiness of the wings, which have a fringe of hair all around and also on the veins. The wings at rest are usually held over the back in a roof-like manner. They are nearly related to the midges, etc.

In the "Fauna Hawaiiensis," but two species of Psychodidae are recorded: *Psychoda alternata* Say, and *Psychoda inornata* Grimshaw, both from Kona, Hawaii. Our species is the latter or an unrecorded one.

Description of larvae—about 2.5 mm. long; blackish in color; flattish, head narrower than rest of body; an elongate respiratory tube at posterior end; a row of spiracles on each side; dorsal segments have several decumbent hairs; a series of narrow transverse dorsal plates, two per segment. Head well developed, has mandibles, a pair of eyes wide apart. Minutely pubescent.

* Later they were found breeding in abundance in cow manure, which was probably the source of the numerous swarms which appeared.

Pupa—about 2mm.; yellowish; wing-cases extending nearly to apex of 3rd abdominal segment, free at the tip; abdominal segments 3-8 freely movable, apical edges somewhat produced and there are several spines on dorsal apical margins, on ventral side are 2 spines per segment about midway between base and apex; from the movability of the segments with the assistance of these spines the pupa is capable of progressing thru the material in which it lives. Compound eyes distinct; two thoracic forward-projecting respiratory tubes.

The length of time for the different stages was not ascertained, nor other details of life history. When the flies emerge from the pupae their wings develop with great rapidity, being ready for use in a very few moments.

Of the 34 species of Psychodidae described for North America, the life history of but one is known. This is *Pericoma californica* Kincaid.* The larvae are elongate oval in form and have a row of eight median ventral suckers by which they cling to rocks in or on the margin of streams, where they are constantly wetted by the dashing water. They breathe by means of two spiracles at the posterior end. When ready to pupate the larvae crawl a little higher on the stones, where only the spray will reach them, and fix themselves to the rock and transform to small turtle-back shaped pupae in which they remain about two weeks.

Other species have been reared from manure, but the larvae not obtained. Dr. Howard reared *Psychoda minuta* from cow manure while making studies on the horn-fly.

The life history of one British species is known. (*Pericoma canescens*)† It lives in water, and feeds on green algae. Three Brazilian species have similar habits: *Maruina ursula, M. spinosa* and *M. pilosella.*** The larvae have a row of 8 suctorial discs on the ventral side by which they cling to "rocky walls covered with a slippery carpet of algae, and kept moist by the spray of waterfalls or by drops of water running down from above." In two species, they have tracheal gills situated at the posterior end of body; in one species the tracheal gills are situated along sides, and a respiratory tube at posterior end. They have two eyes.

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*Kellogg, Ent. News, p. 46, 1901.

†Miall and Walker, Trans. Ent. Soc. London, p. 141, 1895.

**Müller, Trans. Ent. Soc. London, p. 483, 1895.

From this comparison it is seen that so far as known, there are two habits of living for members of this family: larvae of some species live on algae in running water or moist places; larvae of other species breed in manure and decomposing organic matter.

Mr. Kotinsky had been pestered by this and another small dipteron swarming about the lamp in his study. He was certain that they both breed in the moist rice chaff placed in a sake tub with growing ferns. Mr. Swezey observed that the comparison between the Brazilian species and the one studied by Mrs. Swezey is interesting in that the former replenished the air supply by means of tracheal gills while the latter breathed by means of spiracle tubes, as well as tracheæ.

Notes on Crabronidae [Hymen.]

BY R. C. L. PERKINS, SC. D. (*)

Observations on recent Swarms of Caterpillars at Kaimuki

BY OTTO H. SWEZEY.

The copious rains of December and January caused a luxuriant growth of grass and weeds to spring up in this barren district; and also the Lantana and other nearly dead shrubbery to take on a vigorous growth. This growth was soon attacked by numerous caterpillars, however, and in many cases the plants entirely stripped of their foliage. The following species were most conspicuous:

Vanessa cardui, feeding on *Malva.*

Vanessa huntera, feeding on *Gnaphalium.*

Sphinx convolvuli, feeding on *Ipomoea,* also occasionally on *Xanthium.*

Deilephila lineata, feeding on *Portulaca, Boerhaavia* and occasionally *Xanthium.*

Leucania unipuncta, feeding on various grasses.

Leucania amblycasis, an occasional caterpillar in grass.

Agrotis crinigera, feeding on grasses, *Datura* and *Sida.*

Agrotis dislocata, feeding on grasses and *Gnaphalium.*

Agrotis saucia, not numerous, feeding on *Sonchus* and other weeds.

Agrotis ypsilon, a few on *Sonchus* and other weeds.

* Owing to the absence of Dr. Perkins, the MS. of this paper was not obtainable.—Eds.

Heliothis armigera, only a few, feeding on flowers and buds of *Sida* and *Malva.*

Spodoptera mauritia, feeding on *Xanthium, Strammonium,* and the following grasses: *Eragrostis, Cenchrus echinatus, Panicum cinereum, P. nephelophilum var. xerophilum, Cynodon dactylon, Chloris radiata, Chloris* sp., *Eleusine indica, Eleusine* sp.

Spodoptera exigua, feeding on grasses, *Nicotiana glauca* and *Sonchus.*

Plusia chalcites, feeding on nearly everything; has stripped *Sonchus,* even eating the tender stems; has eaten off many tips of Lantana shoots; stripped or riddled the leaves of the following: *Datura, Xanthium, Ipomoea, Sida,* tomato, and many other plants.

Omiodes accepta, feeding on grasses.

Omiodes continuatalis, feeding on "pili" grass(*Heteropogon contortus*).

Omiodes localis, feeding on grasses.

Omiodes demaratalis, feeding on grasses.

Hymenia recurvalis, feeding on *Euxolus* and *Portulaca.*

MARCH 7th, 1907

The twenty-sixth regular meeting was held in the Entomological Laboratory of the Experiment Station, H. S. P. A., Mr. Giffard in the chair.

Members elected: Messrs. E. D. Tenney, E. E. Paxton and T. Clive Davies.

NOTES AND EXHIBITION OF SPECIMENS.

Dr. Perkins presented notes on new Dryinidae from Arizona collected by Prof. Koebele during last year* and exhibited the following series of specimens:

Chalcogonatopus 14.
Agonatopus (n. g.) 5.
Gonatopus 1.
Neogonatopus 2.
Pseudogonatopus 2.

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* Published as Bull. Ent. H. S. P. A., IV pp. 1—59 (1907).

Agonatopoides (n. g.) 1.
Eucamplonyx (n. g.) 1.
Apterodryinus (n. g.) 1.
Neodryinus 1.
Hesperodryinus (n. g.) 3.
Perodryinus (n. g.) 1.
Deinodryinus (n. g.) 2.

Dr. Perkins also exhibited a species of *Eupelmus,* remarking that while the pronotum in the females of the *Gonatopus* and its allies is freely movable, a most unusual condition in Hymenoptera, the thorax of the Eupelminæ is still more remarkable, the suture between the mesonotum and scutellum allowing of movement. Thus while the thorax behind the posterior margin of the mesonotum is in one position at about right angles to the mesonotum itself, it can at the will of the insect be so straightened out that the mesonotum and parts behind it are in the same horizontal plane.

Mr. Kotinsky then read a note on "Hawaiian species of *Pseudococcus* allied to *citri.*" The author was certain that the *Pseudococcus* on pineapple, sisal, and sour-sop was distinct from *P. citri* but had not as yet discovered taxonomic characters to differentiate them.

APRIL 4th, 1907

The twenty-seventh regular meeting was held in the Library of the Board of Agriculture and Forestry, Mr. Giffard in the chair.

NOTES AND EXHIBITION OF SPECIMENS.

Dr. Cobb exhibited a linen tester, the lower lens of which was graduated in two directions to $\frac{1}{2}$ and $\frac{1}{4}$ mm. which he thought should facilitate the counting of punctures and other structures upon a given area of an insect. He also exhibited an ordinary pocket lens the cover of which was so perforated that a dissecting pin penetrating the perforation might be extended below to the focal distance and center of the lens, thus serving as an aid in dissection.

Mr. Terry exhibited specimens and read a note on what he considered was accidental parasitism, viz.: *Chalcis obscurata* bred from a Tachinid pupa within that of a lepidopterous pupa. Dr. Perkins stated that judging from the fact that the

same chalcid was bred from Ichneumons within lepidopterous pupae it would seem to show that the insect is a primary and secondary parasite at the same time and that we are gradually being forced to abandon the old idea of a parasitic insect being either exclusively primary or exclusively secondary.

Mr. Kotinsky recorded an addition to the Hawaiian insect fauna by the permanent establishment of *Eucoila impatiens* Say on the Islands, Mr. Jordan and he having collected four specimens that morning at Palolo. Mr. Swezey added that he had collected a specimen of the same species in town on the 29th of the previous month.

PAPERS READ.

A Note on the Introduction of Culex fatigans into the Hawaiian Islands. [Diptera]

BY G. W. KIRKALDY.

In 1861 Osten Sacken gave 1828-30 as the date of the supposed introduction of mosquitoes into these Islands,* while lately Van Dine referred it back to 1826 **.

According to Fornander (***) S. M. Kamakau (one of the older Hawaiian historians) "states that fleas and mosquitoes were unknown in the Hawaiian group until the arrival of Cook's ships," implying that they were introduced then; so that if this is correct these pests arrived hereabout 1778-9 instead of 1826-30.

Odynerus Parasites [Hymen.]

BY OTTO H. SWEZEY.

(i) *Melittobia hawaiiensis* Perkins.

A large number of this parasite was reared from material handed me by Mr. W. M. Giffard, collected by him in Moana-

* "Einführung von Mücken auf der Sandwich—Inseln," 1861 Stettin. Ent. Zeit., XXII, 51-2; see also the same author, "Facts concerning the importation or non-importation of Diptera into distant countries," 1884, T. E. S. London 494.

** "Mosquitoes in Hawaii," 1904, Bull. Hawaii (U. S.) Agr. Sta. 6 p. 1–30.

*** "An account of the Polynesian Race," II. 199.

lua Valley, at about 200 feet elevation, January 14, 1907. A large number of small pupae was in a mass together with the remains of some larva upon which they had fed as parasites. There was no means of determining what this host larva was; but it was supposed to be either an *Odynerus* or a *Pison* larva, as there were *Pison* cocoons and remains of *Odynerus* nests in the pieces of rotten wood (Breadfruit tree) in which this mass of parasitic pupae was found. There were also cocoons of what appeared to be a *Megachile;* also a beetle larva which on rearing proved to be *Ceresium simplex,* and also among the numerous burrows was "frass" of some wood-boring *Tineid* larva, all of which made it the more difficult to determine the true host with certainty.

The following week these pupae transformed to the adult parasites.* They were nearly all females, but one male was observed. After remaining together in a tube for a few days after maturing, 12 females were removed to a tube containing several larvae of the mud-dauber wasp (*Sceliphron caementarius*); several larvae of this wasp were also put in the tube with the remaining parasites. Many females were observed in the act of ovipositing in these larvae. In a week's time, small larvae of the parasite were observed very numerous feeding externally on the larvae of the wasp, and in about another week they entirely consumed their hosts and began to pupate. The first ones matured in 21 days from the time eggs were first laid. A count made of the number of parasites per host gave 448 for one (of which only 8 were males), and 324 for another. In one instance a larva within a cocoon was parasitized. No opening could be found by which an adult parasite could have entered. The eggs must have been laid by piercing the cocoon with the ovipositor, in which case perhaps the eggs were not deposited within the host, but on the outside where they normally feed after hatching. Perhaps this would be the normal method of laying eggs.

After starting the above experiments in breeding this parasite, some larvae of *Odynerus nigripennis* and *Pison hospes* were obtained, and parasites admitted to them. They bred upon these the same as upon the former host. In the case of the *Pison* larvae, one without a cocoon remained unparasitized, while two within cocoons were parasitized.

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* Being referred to Dr. Perkins for identification he has described it as a new species.

These experiments prove that this parasite will attack and breed upon three different kinds of wasps, of somewhat different habits; but does not help to determine what it was upon which they were originally discovered by Mr. Giffard. Undoubtedly it was either *Odynerus* or *Pison*. From its prolificness, if it has but recently become introduced, it will soon be numerous enough and sufficiently spread so that observers will ere long be finding it, and mayhap under circumstances in which its host can readily be determined.

If it should prey chiefly upon *Odynerus* species, its presence will be detrimental, as the *Odyneri* store up caterpillars for food for their young; but if it should prey chiefly upon *Pison* and *Sceliphron* its presence would be beneficial as these latter wasps both store up spiders for their young.

(ii) *Ageniaspis sp.* (?)

This small Chalcid-fly I have found widely distributed in the Hawaiian Islands; having found it breeding on *Odynerus* larvae, or finding the remains of larvae upon which they have fed, in nests of *Odynerus nigripennis* which I have examined in Nuuanu and Makiki Valley, Oahu; Iao Valley, Maui, and in Kau, Hawaii. In each of the places mentioned I have found that the parasites were numerous. In one instance, I bred 105 parasites from one *Odynerus nigripennis* larva. Where I have found parasitized larvae they have always been full-grown; and when the parasites become fullgrown and pupate they have eaten the entire contents of their host and completely fill its skin. They can be seen thru the partially transparent skin, packed so close that the skin bulges where it conforms to the parasites inside. The adult parasites escape from the mud cell of the wasp by gnawing a tiny hole thru the plug of mud which sealed it.

I first observed this parasite in December, 1905. In June, 1906, I made several attempts to breed them on the larvae of *Sceliphron caementarius;* but was entirely unsuccessful. The other parts of its life cycle yet remain to be worked out.

This is unquestionably a detrimental parasite, as it, so far as I know, preys only on *Odynerus* species.

Melittobia hawaiiensis sp. nov. [Hymen.]

BY R. C. L. PERKINS.

Black, or brownish black, the thorax with a faint aeneous reflection, the head and thorax also faintly metallic. The mandibles are reddish and the scape of the antennae is more or less pale, sometimes clear yellow, at other times only more or less obscurely brown in dried specimens. The tibiae and tarsi are yellow, the femora dark, or at least more or less sordid. In fresh specimens the ocelli are enclosed in a pale ring, and the eyes pale-margined, while there is a pale median line on the face, furcate above and below, forming an elongate X-like mark. The mesothoracic sutures are mostly pale, as also the parapsidal furrows and the scutellar grooves. In dry specimens generally all these pale markings disappear. Head convex in front in fresh examples, but collapsing altogether in dry ones; the antennae with elongate scape, widening to the apex, and about as long as the pedicel and funicle joints together, the pedicel obconical and longer than the first funicle joint, the latter not differing much from the two following, and transverse on their widest faces, the club ovate, twice as long as its greatest width, about equal to the three funicle joints together, and with a spine at the apex. Thorax with very short hairs and very minutely punctured, the propodeum smooth and shining and with a median groove. Abdomen usually subparallel-sided in dry specimens and elongate, being about as long as the head and thorax together or rather more. Length rather more than 1mm. Wings evenly dotted with short hairs and with short marginal fringe; the marginal vein with two rows of long and some shorter setae. Male quite unlike the female, blind and with very different antennae, which are 9, not 8-jointed. Color, yellow or brown, sometimes more or less darker in parts, the apical joints of the antennae more or less black. Scape very large, subtriangular, and about as long as all the other antennal joints together; it is concave beneath and some of the following joints are usually withdrawn into the concavity, which is partly closed by the incurved sides, pedicel laminate and often entirely hidden beneath the scape, first funicle joint triangular, very narrow at the base, second and third not differing much from one another, both being wide, fourth very short and transverse, club three-jointed, the funicle joints are set with longish setae.

Wings rudimentary, the front pair about as long as the thorax, the marginal vein very long, reaching nearly from base to apex and clothed with many long bristles.

var. *peles* nov.

A single specimen taken at Kilauea in July, 1906, is probably a distinct species; it appears to be larger and wider, and is darker in color; the scape of the antennae is altogether dark, or at most a little rufescent. The thorax is not aeneous.

Hab: Oahu and Hawaii (var. *peles*).

Dr. Perkins said that in his description of *M. hawaiiensis*, he did not indicate the location of the type and did not consider it necessary, among other reasons, because the specimens could not be preserved in satisfactory condition for subsequent comparison.

An Omiodes Egg-Parasite.

Trichogramma prestiosa Riley [Hymen.]

BY OTTO H. SWEZEY.

On the leaves of wild bananas growing in a gulch near the upper part of the sugar plantation, at Honomu, Hawaii, I observed some caterpillars of a species of *Omiodes* not as yet to be determined till the caterpillars have matured.* I also found several batches of eggs which proved to be the same species. Very few caterpillars hatched from these eggs, however, as they were nearly all parasitized, the parasites emerging March 25-30. There were 1 to 3 per egg. They gnawed out before their wings had expanded.

I referred specimens to Dr. Perkins, who, on comparing them with the original description of *Trichogramma pretiosa* finds it is apparently this species. I have since observed them at the Capitol grounds, Honolulu, in the act of ovipositing in eggs of the palm leaf-roller (*Omiodes blackburni*). I take it to be the first record of their presence here. I do not know whether Mr. Koebele introduced them, or whether they have

* On maturity, these proved to be a new species, which has been described by Mr. Swezey under the name *Omiodes meyricki*. Bull. V, Exp. Sta. H. S. P. A. Div. Ent. p. 24, 1907.—[Eds].

been accidentally introduced. The species occurs thruout the United States from Massachusetts to Colorado, and from Canada to Florida and Texas. It is recorded as bred from eggs of cotton worm (*Aletia argillacea*), cotton boll-worm (*Heliothis armigera*), zebra moth (*Mamestra picta*), codling moth (*Cydia pomonella*) and *Ianassa lignicolor.*

This is a valuable addition to the large list of parasites preying upon leaf-roller caterpillars in these islands. No doubt it will be found to be well distributed already.

MAY 2nd, 1907

The twenty-eighth regular meeting was held in the Entomological Laboratory of the Hawaiian Sugar Planters' Experiment Station, Mr. Giffard in the chair.

NOTES AND EXHIBITION OF SPECIMENS.

Mr. Terry exhibited a native Dipteron (*Drosophila picticornis,* Grimshaw) bred in Honolulu from decayed bananas, from a few females taken on Tantalus.

Mr. Kotinsky exhibited a female specimen of the Orthopteron *Holochlora venosa* Stal, collected by Mr. G. A. Jordan in an orchard up Nuuanu Valley during the last week of April. Mr. Giffard's collection of the first specimen seen on these islands, about a year and a half ago, was recorded in these Proceedings (page 32), where it was assumed to be a species of *Microcentrum.* Since then another specimen was collected in Makiki and deposited in the Territorial entomological collection, and more recently Mr. Jordan collected several females in various stages of development in Nuuanu Valley. Egg-batches in slits of young shoots of Mango and Orange had since been collected, and the young hatched from them were submitted to Mr. Swezey, who stated that they looked different from similar stages of the other Locustids on these islands. Dr. Perkins had in his collection similar egg batches collected in Honolulu some ten years ago. So far no parasites had been bred from the eggs, and it would be interesting to find out the cause of the appparent rarity of the species.

Mr. Craw reported the receipt of a colony of parasites of orange aphis from California and the difficulty of locating it

here for want of aphis on citrus plants in Honolulu. Mr. Kotinsky had, however, located a citrus tree at Wahiawa, well stocked with aphis and there released a colony of the parasites.

Mr. Kotinsky reported breeding *Eretmocerus corni* Hald. from pupae of *Aleyrodes hibisci* collected in Honolulu. The parasite was determined by Dr. Perkins.

PAPERS READ.

Breeding Experiments and some Observations on the Life History of Rhyncogonus blackburni Sharp.

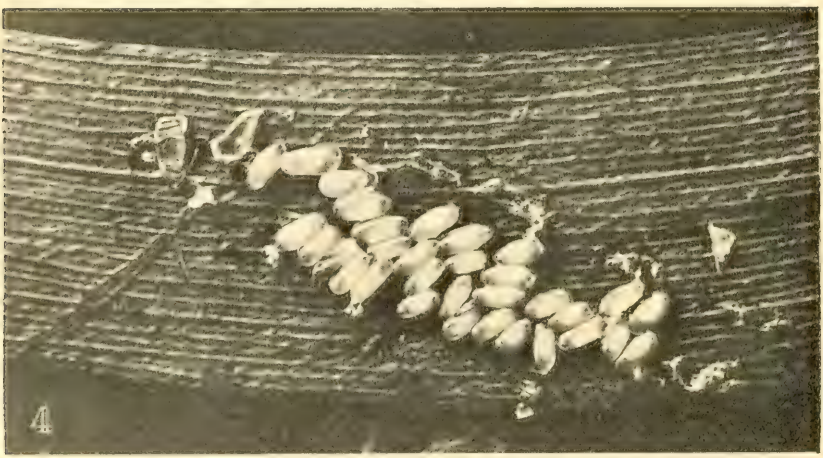
BY W. M. GIFFARD.

The absence of any information relative to the life history of this interesting Hawaiian *Otiorhynchine* (Pl. 3, Figs. 1 & 2) led me to undertake a series of general observations as to its methods of reproduction. These observations are at present limited to the oviposition and the earlier stages of the larva, but owing to the fact that this insect is restricted to the native forest belt and that these observations have of necessity been conducted in the forest itself, it has been impracticable up to the present time to make a close study of many points in its life history which would probably be of great interest. The experiments undertaken were first conducted within a closed vessel at an elevation of 1300 feet. In this instance eighteen beetles in all were taken by me from a tree (*Acacia koa*) in the native forest adjacent to my mountain home on Tantalus, six of which were females, and twelve males. Two of the females disappeared from the jar within the first week of their captivity, leaving only four of that sex to breed with. These four females were confined with a number of the males for a period of sixty days, fresh koa twigs with leaves attached having been supplied to them every sixth day. The first batches of eggs, three in number, were discovered twenty days after the beetles had been confined. During the next forty days, forty-two batches of eggs were taken, making forty-five batches in all during the period of captivity. Of these the largest proportion was placed in another breeding jar for further observation. It will therefore be seen that during the period of sixty days above referred to, each female produced an average of say

eleven egg batches. These egg batches were found attached to the koa leaves in single layered masses consisting of from seven to fifty-two eggs (Pl. 3, Fig. 4.) In every instance under examination, whether in capticity in jars or under a net on selected branches of the living tree itself, it was found that the female concealed her egg batch by covering it with an adjoining leaf or some portion thereof. To attain this purpose, the female deposits a quantity of mucous around the margin of the egg batch to which the protecting leaf adheres. (Pl. 3, Fig. 3). My observations during the above period show that the time necessary for the hatching of the eggs averaged in these instances about thirteen days from the date of their oviposition. The larvae hatched out from all these eggs have been deposited in soil and roots in glass jars for future observation.

The scarcity of the beetle led me to make an effort to find a possible parasite and in consequence the adoption of another method of experimenting was undertaken. Having selected a suitable koa tree, I placed over one of its smaller branches a net bag within which were deposited the remaining beetles from the jar, adding several others taken by me subsequently. Whether owing to the ovipositing period having nearly ceased or for other unknown reasons, I found a marked decrease of egg production in spite of the addition of several females to the colony. During a period of seventy-seven days only twenty-one batches were found, as against forty-five in the sixty days previously noted. Periodic visits were made every tenth or twelfth day to the tree, transferring both net and beetles to a new branch on every visit, at which time the egg batches were counted and recorded, but left exposed for any attack of parasites during the ensuing ten or twelve days. The hatching period in these instances averaged sixteen days from the date of oviposition, or an average of about six days after cutting away the egg batches from the branch.

At the close of the experiments above referred to, ten live beetles, (six males and four females) were taken from the net and placed in a small glass jar to further determine the time necessary for the hatching of such eggs as might be oviposited. Eight batches in all were taken from the jar within forty-eight hours of the confinement of the colony. The leaf concealing each batch was carefully withdrawn and the eggs in each counted. The total oviposition by these four females during the forty-eight hours was found to be two hundred and thirty



GIFFARD—ON RHYNCOGONUS BLACKBURNI

eggs, averaging over twenty-eight to a batch, the minimum being fifteen and the maximum fifty-two in the eight batches referred to. My earlier observations disclosed the fact that the females in captivity in large glass breeding jars oviposited to a much greater extent than when placed under a net on branches of the tree in the open, and these later investigations further show that in the smaller enclosure (a jam jar) the oviposition was still more rapid and that the batches contained a much larger percentage of eggs than in the previous experiments.

The sexes of the beetles comprising the whole colony under observation (including those bred in jars) has been determined as thirteen males and eight females.

At the beginning of the outdoor experiments referred to, koa trees were searched for egg batches and after much labor one leaf was found apparently similar in appearance to those produced by the colony. This leaf was taken home and placed in a glass test tube and ten days later instead of the larvae I found that Chalcid parasites were emerging, eleven of which were saved and three or four others accidentally lost. At this early period of my observations it was not certain, however, that this Chalcid was a true parasite of the egg of *Rhyncogonus*, but that it really was such was afterwards proven. One of the egg batches which had been left exposed on the tree, at a subsequent visitation, was placed in a glass tube and some of the eggs began hatching on the sixth day after their removal from the tree. Noticing but few larvae emerging from this particular batch, it was left in the tube for a longer period than usual and nineteen days later two Chalcid parasites emerged through the protecting leaf cover of the egg mass. This fact and later investigations of the remaining eggs proved conclusively that these Chalcids were similar to the previous species above referred to, and that they were true egg parasites. Both these Chalcids, as well as the previous lot, were identified by Dr. Perkins as an Eupelmid (Text Fig. on p. 133). I understand Dr. Perkins intends to supplement my observations on the breeding of this parasite by a few notes of his own, which may further elucidate its habits.

EXPLANATION OF PL. 3.

Fig. 1. Rhyncogonus blackburni ♀ ; fig. 2. ♂ of the same; fig. 3. Koa leaves enclosing egg batch; fig. 4. Egg batch exposed.

Supplementary Notes on Rhyncogonus blackburni and Its Parasites.

BY R. C. L. PERKINS.

(With figure)

In the Annual Address to this Society for the year 1905, after giving an account of the insects inhabiting a portion of the mountains near Honolulu, in some concluding remarks I observed that "to know the life-history of *Rhyncogonus blackburni* and why it remains so comparatively weak in individuals, or to fully ascertain the life-history of some of the Carabids, and why again some are so common, others so extremely rare, would be far more interesting than the discovery of half a dozen new *Proterhinus* which would surely differ but little from species already known." From Mr. Giffard's interesting paper just read, it will be seen that the desired information as to the *Rhyncogonus* is now largely supplied.

The distribution on Oahu of *Rhyncogonus blackburni* is not exactly known, but it is almost certainly absent from the Northern third of the long Koolau range, which has been much collected over, and it is probably absent from the middle third also. It has never been taken, in fact, on any part of the range north of Nuuanu Valley, which very possibly limits its distribution. It occurs throughout the mountains south of Nuuanu, wherever they have been investigated, but only at certain elevations being absent from the higher and wetter portions of the range. It is partial to many other trees besides *Acacia koa,* such as *Straussia, Euphorbia,* etc., and is even found on ferns such as *Gleichenia dichotoma.* It is absent from, or at least has never been found in the Waianae range of mountains. In its own limits it is overlapped by *R. koebelei* and possibly other species, and outside the limits it is replaced by several other forms at present undetermined. It is rather of a social nature (being like other *Rhyncogonus* in this respect) so that not infrequently four or five individuals will be found in company, sometimes even closely packed together, when at rest, and the sexes are usually *in coitu.* In beating trees, it is often found singly, but this is no doubt due to the fact that some fall clear of the beating cloth or umbrella, and consequently are not noticed.

The large size of the beetles (as compared with most native Coleoptera) and their extreme tenacity of life under almost any

circumstances as well as the ease with which they are collected, when considered in connection with the sparseness of individuals, rendered it almost certain that they would be subject to the attacks of parasites. It was also certain that these parasites when discovered would be of small size and that a moderate sized Ichneumonid or Braconid was not to be looked for, since none such (other than can be otherwise accounted for) are to be found in the haunts of *Rhyncogonus* throughout the islands. Through Mr. Giffard's perseverance, we are now able to say that one check, and no doubt a very important one, to the multiplication of *Rhyncogonus blackburni* is an egg-parasite of the genus *Eupelmus,* the species being previously undescribed. From the specimens of egg-masses of the beetle submitted to me by Mr. Giffard, from which two of the parasites had emerged, I suspect that one egg affords sufficient food for one parasite, though the latter is of large size for the amount of nutriment that it would thence obtain. When I exposed these egg masses by separating the koa leaves, which were very firmly glued together and concealed them, in both cases I found the remaining eggs, together with some dead larvae of the beetle, to be covered with a mass of minute Acari, which had partially devoured them, as also several still immature pupae of the *Eupelmus.* The attacks of Acarids are frequently a cause of great trouble in rearing insects in captivity in these islands, but seem to be of comparatively small account under natural conditions. The two parasites, that had emerged from one of the egg-masses had escaped by the same round hole gnawed through the Acacia leaf. The other eggs-mass had also been parasitized, but the contents all destroyed by the Acarids. Probably the *Eupelmus,* like some other egg-parasites, will only attack the eggs when comparatively freshly laid, and the extremely wet weather would sufficiently account for the fact that not more of the egg-masses, exposed to parasitic attack by Mr. Giffard, were parasitized. No doubt, in many of the eggs experimented with, embryonic development had already advanced too far before their exposure to parasites. It is noteworthy that the one egg-mass found under natural conditions yielded parasites only.

The Hawaiian species of *Eupelmus* are numerous, and the parasite of *Rhyncogonus* is one of the smallest of these. The genus as represented in the islands is very remarkable for the diversity in habits of the different species. One is known to be parasitic on Coleopterous larvae (Anobiidae), one has been

bred by Mr. Swezey and myself from the puparium of the Neuropterous *Anomalochrysa*, and one by Mr. Terry from the eggs of the Locustid, *Brachymetopa*. Another I have bred freely from very rotten wet wood, which yielded otherwise only Lepidopterous (Gelechiid) larvae, but in this case the host is necessarily uncertain.

The species are very difficult to determine, being variable, and with extreme sexual dimorphism, so that the sexes can not possibly be correlated except by breeding. Judging by the bred specimens I have examined, there is no such variation in the length of the ovipositor, as Ashmead allows in his descriptions in the Fauna Hawaiiensis, and the sexes are almost certainly wrongly assigned in that work. I have somewhat reluctantly described this egg-parasite of *Rhyncogonus*, for though I am quite satisfied it is undescribed, I do not feel that the material of this genus that is accessible to me for study at the present time, is sufficient for a proper understanding of the importance of specific characters in the Hawaiian species. Nothing is likely to prove a greater hindrance to the advance of knowledge of the Hawaiian fauna than the description of new forms off-hand in these difficult genera of many endemic species, when one is imperfectly acquainted with the value of their characters, and these can only be appreciated after studying a comprehensive collection. The material accessible to me for study and comparison is less than two hundred specimens of indigenous *Eupelmus* and I should be very pleased to obtain specimens (which are the most easily collected of all native Chalcids) from the members of the Society. With a thousand examples from various localities, an adequate knowledge of the Hawaiian forms might be obtained and the Hawaiian species redescribed to advantage. The fact that this species has been bred, and the interest that attaches to it in connection with Mr. Giffard's paper on the habits of *Rhyncogonus blackburni*, may excuse the deficiencies, which will no doubt be subsequently found, in my description.

Eupelmus rhyncogoni sp nov.

Female, metallic green, the face blue-black or purplish black, the thorax and head with more or less brassy reflections in parts, the abdomen usually metallic blue, green in part; the scape of the antennae, all the legs including the coxae, and the mesopleura are testaceous; the scape is darker, more brown

in some examples, but in others quite clear, with the apex only infuscate; the flagellum black or brownish black, the coxae

x-18

slightly darkened and metallic at the base, at least outwardly, the mesosternum is brownish or pitchy with metallic reflection, the mesepleura very distinctly metallic in front, but elsewhere slightly or not at all; the ovipositor yellowish.

Head appearing finely shagreened, and with very shallow punctures; thorax clothed with pale pubescence, appearing shagreened from the close reticulate surface sculpture and with very shallow obsolescent punctures; scutellum and axillae also shagreened, the propodeum smooth and shining; wings hyaline, faintly yellow-tinged, the neuration pale, but darker basally. Abdomen sculptured, having a close microscopic reticulation of the surface; ovipositor short, about as long as the basal joint of the hind tarsi. Length 2.5 mm.

Male dark metallic blue, the thorax with more or less green reflections, the legs dark, with the knees, tips of tibiae, and tarsi obscured or sordidly pale; base of abdomen brightly metallic blue, the rest black with dark purplish tinge.

Scape of antennae subtriangular, the lower side strongly rounded, the lower apical angle being rounded off or effaced; the pedicel much smaller than the first of the funicle joints, which do not differ much from one another, being mostly rather longer than their greatest width, and densely short-haired, noticeably more so than the pedicel. Thorax appearing shagreened from dense microscopic reticulation and with feeble punctures, the propodeum smooth and shining. Wings hyaline, clearer (not yellow-tinged) than in the female, a large oblique hairless

area extending from beneath the middle of the marginal vein. Length 1.75 mm, but some are much smaller than this.

Hab. Oahu, Mount Tantalus; bred from eggs of *Rhyncogonus blackburni* by Mr. W. M. Giffard. I have drawn up the description from five of these, and from one male and several females captured by myself at various times in the mountains around Honolulu. Last October on a wet day two females were captured hiding in the leaves of *Freycinetia,* in company with the male of a very different species of *Eupelmus.*

JUNE 6th, 1907

The twenty-ninth regular meeting of the Society was held in the library of the Board of Agriculture and Forestry, Mr. Swezey in the chair.

NOTES AND EXHIBITION OF SPECIMENS.

Mr. Wilder expressed the regret that a specimen of *Holochlora venosa,* apparently a male, that he captured in his yard was unfortunately lost.

Mr. Swezey exhibited a series of moths bred from caterpillars found on wild banana leaves at Honomu, Hawaii, at an elevation of about 1500 feet. He considers it a new species of *Omiodes,* and has named it *meyricki,* for Mr. E. Meyrick, who worked up the Macrolepidoptera for the "Fauna Hawaiiensis." This species is closely allied to the palm leaf-roller (*Omiodes blackburni*). Mr. Swezey exhibited moths of this latter species, also, for comparison, as well as egg-clusters and caterpillers of both species; and pointed out the distinctions between the two species. The egg-masses of *meyricki* are more rounded and less flat than those of *blackburni,* and are placed directly on the surface of the leaf; whereas those of *blackburni* are elongate, and are placed in a groove of the leaf or along beside a mid-rib or vein. The caterpillars of *meyricki* are very smooth and nearly free from black markings; while those of *blackburni* have many black spots on the head; the cervical shield is heavily black-marked; and the tubercles of all segments are more or less margined with black. The pattern of the wings of *meyricki* is identical with that of *blackburni* except that the postmedian line of hind wings is distinctly nearer the margin. The fore wings of the males of *meyricki* are suffused with ferruginous, while those of *blackburni* have

more or less dark fuscous suffusion. The hind wings of both sexes of *meyricki* are darker fuscous than those of *blackburni*. Some of the scales in the patagia of *meyricki* are tipped with fuscous, not so in *blackburni*. (Full description of moth and caterpillar, and life history published elsewhere.)*

PAPERS READ.

Biological Notes on the Hemiptera of the Hawaiian Isles No. 1.

BY G. W. KIRKALDY.

The classification of the Hemiptera has, in the past, been based entirely (1) upon characters afforded by the imago, so that it is not surprising that the Hemiptera remain, in that respect, in a very unsatisfactory state.

The Ontogeny of a living thing is an epitome of its Phylogeny, though this may sometimes be partially obscured, among Insects perhaps less in an exopterygote, paurometabolous Homomorph, as, *e. g.*, a Hemipteron, than in an endopterygote homometabolous Heteromorph, such as a Lepidopteron (2). It is therefore remarkable that the usually easily reared Hemiptera have been neglected in this wise to a greater extent than any of the larger Orders of Hexapoda (3), neglected so greatly that a biologic note on any Hemipteron save a destructive pest is a matter for happy surprise.

This is all the more remarkable when it is considered that the form of the ova and the manner of their deposition and the colours, patterns and structures of the nymphal instars, are in themselves profoundly interesting and that they also yield characters of generic or specific value.

In former times, the adult wingless forms of certain Hemiptera were rejected as being immature; of recent years, nymphs have been mistaken for adults and relied upon for the creation of genera! for example, *Budaeus* and *Critobulus* in the Geocor-

* Bull. Ent. H. S. P. A., V. p. 24 (1907).

(1) Except in the Sternorhynchous Homoptera.

(2) In many Diptera, this recapitulation is exceedingly rapid, and probably greatly obscured.

(3) Easily reared under sufficiently natural conditions, but, in these Islands, it is almost impossible to rear-up, at sea-level, from ova or young nymphs, bugs and hoppers inhabiting the mountain forests.

idae, *Stegius* and *Eriximachus* in the Reduviidae, described by Distant, and *Acanthicus* of Laporte in the Membracidae.

Hemiptera usually deposit their ova on the surface of leaves or twigs, or insert them in slits made in these. The nymphs are usually free, but in some groups are concealed in spume or in calcareous cases, while a few form galls. They differ from their adults principally by the condition of the flight organs, which are gradually developed outside the body, forming in the ultimate nymphal instar four, more or less free, pads. Other distinctions lie in the number and form of the segments of the antennae, labium and legs, the absence of ocelli, the shape of the head and nota, and the development of the genitalia.

In the early instars, the abdomen is only feebly chitinized and, in some families at least, there are median and lateral sternites, with very wide sublateral submembranous parts, the sclerites down the middle also being widely separated one from another. As the instars progress, the membranous areas decrease, till they constitute merely linear separations between the segments, in the fifth instar.

In most Hemiptera, there are apparently 5 nymphal instars. It is still often stated as 4 larval and one pupal, but these are terms that have no place rightly in the horismology of the Homomorpha.

In the Homoptera, adult or nymphs, there are no odoriferous glands though in certain Sternorhynchi there are "honey-glands." In most adult Heteroptera, the orifices of the notorious odoriferous gland are situated on the metapleura, though in some there is a single opening on the metasternum medianly and in a few the glands appear to be absent.

In the nymphs of the first series, the openings are placed on the (abdominal) tergites and afford valuable classificational characters, which have been partially worked out (4) but require much extension.

According to Gulde's researches, it may be supposed that the Cimicidae, Aradidae, Nabidae, Reduviidae, Anthocoridae and Clinocoridae possess 3 glands, opening on the fourth, fifth and sixth tergites (5); of these, the first is paired, having two openings, in many of the Cimicidae. In Lygaeidae, Neididae,

(4) In a valuable paper by Gulde, entitled "Die Dorsaldrüsen der Larven der Hemiptera-Heteroptera", 1902 Ber. Senckenb. Naturf. Ges. Frankf. a M. 85-136, Plates 7-8.

(5) This applies apparently only to the 5th instar.

Macrocephalidae and most Geocoridae, there are 2 glands, opening onto the 5th and 6th tergites; in a few Geocoridae, however, there is an opening also on the fourth. In the Tingidae, there are openings on the fourth and fifth; in the Acanthiidae and Miridae, on the fourth only.

So far as is known—but the knowledge is very scanty—the ova of Cimicidae, Lygaeidae, Pyrrhocoridae, Geocoridae, Tingidae, Anthocoridae, Clinocoridae, Reduviidae, Nepidae, Belostomatidae, Corixidae, Poekillopteridae and Issidae are deposited externally, while those of Naucoridae, Notonectidae, Cicadidae, Cercopidae, Tetigoniidae, Membracidae, Fulgoridae and Asiracidae are inserted more or less internally.

O. M. Reuter commenced his celebrated "Hemiptera Gymnocerata Europae" with the Miridae, on the ground that these appear to be the 'lowest' and most authors seem to agree with him, accepting the Cimicidae as the 'highest.' On the contrary, I think that the nymphal, coxal and venational characters, stamp the Cimicidae as the most primitive of existing Hemiptera; the specialized venation, the nymphal and coxal characters, etc., placing the Miridae at the end of one twig of the second main branch of the Pagiopod series of Heteroptera, the Notonectidae being another of the terminal twigs of the great branch from which the Miridae have sprung.

Distant, in the most recently promulgated classification of the families of the Heteroptera, separates the "Pentatomidae" (i. e. Cimicidae) from all the other families (6) by the character of the scutellum reaching to at least the base of the membrane. As a matter of fact, this is also the case in Aradidae and some Macrocephalidae, so that Distant's classification breaks down at the start. The principal divisions of "Gymnocerata" and "Cryptocerata" are also now discredited.

The following is an attempt to group the Heteroptera more naturally. I have dealt with the Homoptera elsewhere (7).

PHALANX 1 TROCHALOPODA.

SUPERFAMILY 1 *CIMICOIDEA.*

Families *Cimicidae, Aradidae, Lygaeidae, Pyrrhocoridae, Geocoridae* and *Tingidae.*

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(6) After excluding the aquatic and semiaquatic families.

(7) Bull. Ent. H. S. P. A., III. (1907)

SUPERFAMILY 2 *NEPOIDEA.*

Families *Nabidae, Gerridae, Reduviidae, Nepidae, Macrocephalidae* and *Enicocephalidae.*

PHALANX 2 PAGIOPODA.

SUPERFAMILY 1 *MIROIDEA.*

Families *Anthocoridae, Clinocoridae, Polyctenidae, Miridae, Dipsocoridae,* and *Aepophilidae.*

SUPERFAMILY 2 *NOTONECTOIDEA.*

Families *Acanthiidae, Ochteridae, Naucoridae, Belostomatidae, Corixidae* and *Notonectidae.*

The following notes are unfortunately very imperfect, but as so many of the adult Hemiptera differ in colour, pattern and form from their nymphal instars, it seems better to record the known stages of some of those found in Hawaii than to wait indefinitely for full data. The duration of the instars is so variable here as to be of little value for reference, while such details derived from forest dwellers in captivity at the coastline probably bear little relation to their free life.

So little is known of Heteropterous Metamorphoses, that it is scarcely possible to institute comparisons, but the following facts seem of interest:

1. *Oechalia grisea* is remarkably constant in general form through all its stages, except the usual gradual lengthening; the lateral margins of the pronotum in the later stages are also more or less laminate and roughly crenulate. The free first segment of the labium, a character separating the Cimicinae from the Pentatominae, is present in *Oechalia* at the first instar.

2. *Coleotichus blackburniae* has the usual Pentatomine head-form in the nymphal instars, suddenly and considerably altered in the adult. The piceous ground colour of the early nymph stages, deepens to deep black by the fourth and alters to indigo blue in the fifth, but the tergites in the adult are dead black again, while the jewelled green and red head and pronotum bear little semblance to those of the nymphs.

3. *Ithamar hawaiiensis* varies in form and colour in the stages, and in one or more stages is particoloured bristly.

4. *Rhopalus hyalinus* shows the inadequacy and inaccuracy of the old character for separating the Lygaeidae from the Geocoridae, viz., "Supericornes" and "Infericornes." In the nymphs of *Rhopalus,* the antennae are inserted on a line between the eyes and the apex of the head, and the same is the case in the adults, in some of which indeed, they are below the line. The proper character lies in the tegminal venation. In the former there are many veins, at least 8, in the membrane; in the latter, not more than five ([8]).

In *R. hyalinus,* the early nymph stages have a blood-red ground colour, but in the fourth or fifth, the nymphs are greenish testaceous, with dark markings, etc.!

4. The collar in certain Geocorids is present in the nymphs as well as in the adults, affording apparently a good group-character.

5. The labium in young nymphs is of the very long, apparently gradually shortening. The truth is that the abdomen in particular expands and lengthens, while the labium remains almost stationary.

The following forms are considered at more or less length:

Cimicidae:

1. Oechalia grisea. (fig. 1)
2. Coleotichus blackburniae. (figs. 2-4)
3. Geotomus pygmaeus.

Lygaeidae:

4. Rhopalus hyalinus.
5. Ithamar hawaiiensis.

Geocoridae:

6. Orthoea pacifica.
7. Clerada apicicornis.
8. Nysius vinitor.
9. N. delectus.
10. Metrarga nuda.

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(8) The Neididae, treated either as a separate family or as a subfamily of the Lygaeidae, are rightfully a subfamily of the Geocoridae. On the other hand, the Pyrrhocoridae, sometimes ranked as a subfamily of the Geocoridae, are more closely allied to the Lygaeidae. Many authors persist in terming the Geocoridae, "Lygaeidae," although they do not contain the genus *Lygaeus* F. (= *Hoplopterna* Stal). *Lygaeidae* Kirkaldy = *Coreidae* auctt. *Geocoridae* Kirkaldy = *Lygaeidae* auctt.

Tingidae:

11. Teleonemia lantanae.

Nabidae:

12. Nesotyphlias (g. n.) lusciosus.
13. Reduviolus innotatus.
14. R. blackburni.
15. R. kahavalu (sp. n.)

Reduviidae:

16. Zelus peregrinus.

Miridae:

17. Hyalopeplus pellucidus.

Tetigoniidae:

18. Conosanus hospes.
19. Nesophrosyne (g. n.) perkinsi.
20. Nesophryne (g. n.) filicicola (sp. n.)

Poekillopteridae:

21. Siphanta acuta.

Asiracidae:

22. Nesosydne (g. n.) koae (sp. n.)

Cimicidae.

It is in this family and in the Reduviidae, that the maximum of ornateness in Hemipterous ova is displayed.

It is impossible to find space here even to mention all the various papers on the biology of the family. Fabre ([9].) has discussed the metamorphoses of some French forms and especially the mechanism employed in opening the egg-shell; the latter subject has been treated also by Hepmons ([10]). Farbe in the paper cited ([9]) also discussed the interesting subject of maternal solicitude, criticizing the earlier writers on the phenomenon and relegating the affair to the limbo of fairy tales. He, in turn, has been criticized by myself and I have

(9) "Les Pentatomes," 1901 Rev. Quest. Sci. L. 158 repr. in Souv. entom. VIII 66 textfs.

(10) "Über einen Apparat zum Offnen der Eischale bei den Pentatomiden," 1906 Z. Wiss. Insektenbiol. II 73-82, figs. 1-2.

shown that his strictures were based upon misapprehension and want of information ([11]).

The complete metamorphoses are known in very few species. Of the following, however, considerable information is recorded, viz., *Murgantia histrionica* ([12]), *Bathycoelia thalassina* ([13]), and *Tectocoris lineola* ([14]).

In Mexico, *Euschistus sparculus* is made into a kind of flour ([15]) and eaten, while in India, *Erthesina fullo* ([16]) and *Aspongopus nepalensis* ([17]) form a part of the diet of certain natives, the last named species being mixed with rice.

The Cimicidae are probably extensively parasitized. *Phasia* sp. and *Ocyptera bicolor,* among the Diptera, have been noted; *Eucorysses grandis* has been recorded as the host of a stylopid, while a *Telenomus* destroys the eggs of *Eurygaster* and an *Encyrtus* those of *Murgantia.*

Oechalia.

Of this genus, *grisea* was described by Burmeister, *pacifica* and *patruelis* by Stal. Unable to find differential characters in the adults, I followed Blackburn in recognizing only one species. Lately however my doubts have been revived and increased by the discovery of two types of ova.

Both are pale bronzy green. In the first, the upper rim of the egg is furnished with from 9 to 11 whitish, black-tipped capitate processes and there is no ornamentation on the operculum or egg-shell. These ova were found deposited on a fern leaf. In the second, the number of processes was greater, ranging from 14 to 16, and beside a circular row of about 14 short black teeth on the operculum, the sides were reticulated

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(11) Kirkaldy "Upon Maternal Solicitude in ..... Non-social Insects," 1903 Entom. XXXVI 113, and 1904 Smithson. Rep. for 1903, p. 577 (with bibliography), see also Schouteden 1904 Rev. Univ. Bruxelles, VIII, 771. And Dodd "Notes on Maternal Instinct in Rhynchota," 1904 T. E. S. London 483-6, Pl. 28.

(12) Howard 1895 Circ. U. S. Div. Ent., (2) X, 1-2; 1 fig.

(13) Schouteden 1906 Z. Wiss. Insketenbiol., II, 82-8, figs. 1-9.

(14) Dodd, see No. 11.

(15) Signoret 1877 B. S. E. France (5) VII p. XXXVI.

(16) Distant 1878 P. E. S. London p. LVII.

(17) Waterhouse 1900 Entom. XXXIV 251.

with granules. These ova were found on some herbaceous plant. (fig. 1.)

Ovum of *Oechalia grisea*, after emergence of nymph.

Fig. 1.

The species of *Oechalia* are carnivorous, preying on caterpillars of *Omiodes accepta, Scotorythra rara*, etc., though they do not always disdain vegetal juices, at least in captivity. They lurk principally in Filices, or in Kukui (*Aleurites triloba*), and when captured, usually feign death.

In attacking a small larva of *Hymenia recurvalis* in captivity a nymph of *Oechalia* inserted its stylets in one of the clasping legs and maintained its hold,—despite the larva's struggles—without at all employing its fore legs ([18]).

The following descriptions refer to the species which I suppose to be *grisea* (Burm.) and at the same time *patruelis* Stal.

First instar. Vertex and nota, lateral margins of tergites (except sutures), odoriferous flaps, etc., blackish or dark fuscous. Apex of vertex, underside and the rest of the tergites, antennae, labium, eyes, legs, etc., sanguineous. Last segment of tarsi at the apex, and the arolia fuscous; claws red. Last

(18) A popular error among Entomologists is to suppose that the labium (rostrum) acts as a piercing instrument. In such bugs as *Oechalia*, the labium is directed to the supposed prey, and its suitability is ascertained by the sensory hairs at the apex, then the stylets pierce the skin and the labium is applied to the orifice thus make, possibly entering a little as it becomes enlarged.

segment of antennae fuscous, except the extreme base. Rounded, very convex above, flat or concave beneath. Head almost perpendicular. Antennae composed of four segments, the first not reaching to the apex of the head, the second one-half longer than the third and equal to the fourth. Labium reaching to the middle of the abdomen, long and stout.

Second and third instars very similar to the first.

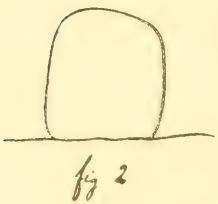
Fourth instar Head and nota blackish brown, inclining to bronzy in large part: anterior half of tylus, lateral margins of juga, antennae, lateral margins of pronotum (except basally), and mesonotum, some marks on head and nota, etc., pale sanguineous, the antennae more or less fuscous in parts. Tergites creamy (with black marks on the lateral margins) variegated with sanguinescent, odoriferous flaps bronzy. Beneath pale, partly sanguineous, lateral margins more or less marked with blackish. Femora, tibiae and tarsi sanguineous, the femora speckled and lined (sparsely), the tibiae apically and basally, the apex of the apical segment of the tarsi, blackish-brown. Juga extending apically a little farther than the tylus, which is equally wide throughout, otherwise as in adult; feebly rastrate. First segment of antennae scarcely reaching to the apex of the juga, second about 3½ times as long as the first and about one-third longer than the third, which is subequal to the fourth. Labium reaching to the hind coxae, originating as in the adult. Tarsi all bisegmentate, the second segment longer than the first. Lateral margins of pronotum laminate, minutely crenulate all along. Three odoriferous flaps, none paired.

Fifth instar is like the 4th, but more purplish-bronzy. The tylus more pointed apically. Blackish brown, bronzed on head, nota, flaps, etc., antennae blackish-brown, apical half of second segment reddish. Lateral margins of nota narrowly yellowish. Labium pale. A reddish black annulus on the hind tibia. Second segment of antennae somewhat obliquely flattened, four times as long as the fouth and about one-half longer than the third, which is equal to the fourth. Second segment of labium two-sevenths longer than the first, one-half longer than the third and a trifle longer than the fourth, the first scarcely reaching beyond the middle of the gula, the second not reaching the apical margin of the prosternum, the third reaching the middle of the mesosternum and the fourth the base of the hind coxae. Lateral margins of pronotum widely reflexed anteriorly, sinuate and minutely crenulate, anterolateral angles rectangular.

Coleotichus blackburniae F. B. White. ([18a])

This probably endemic Scutellerine is the handsomest of Hawaiian Insects. It is found principally on koa trees *(Acacia koa)*, on the leaf-like phyllodes on which it lays its eggs. While *Oechalia* is quiet and a death-feigner, *Coleotichus* whirrs off with a tremendous racket and a great speed, when disturbed. It is apparently vegetarian.

The *ova* are very different from those of *Oechalia,* being golden green (yellowish white in alcohol), not appreciably sculptured and without an operculum. They are deposited in batches of about 19, usually 1 in the middle, 6 around that and 12 around these. They are roundly hexagonal. Their height is about 1.155 mill., diameter from side to side 1.154 mill., from angle to angle 1.442 mill. Beyond a sparse, very minute granulation there is no sculpture visible x. 118. (fig. 2.)



2 Ovum of *Coleotichus blackburniae.*

3 Head of nymph of *blackburniae.*

4 Head of imago of *blackburniae.*.

First instar (?) [perhaps second] Head, nota and coriaceous parts of abdomen blackish, the rest sanguinious, except for the infuscate apex of tarsi, etc. Rounded, very convex dorsally,

(18a)Schouteden in his valuable Monographs of *Coleotichus* and of the Scutellerinae, writes this "*blackburni.*" It was, however, named after Mrs. Blackburn and was published as written above.

flat beneath. Labium reaching well beyond hind coxae. Antennae 5, 7, 8, 16. I can see only two odoriferous orifices (on the 5th and 6th.)

Third instar (?), like the last described, but less rotundate and the dark coriaceous areas on tergites so much larger, that the blood red parts consist only of a sublateral curved band, three anterior transverse stripes and 2 or 3 posterior. Head much as in the 5th instar. Labium reaching to middle of abdomen. Antennae 10, 17, 15, 22. Orifices as before.

Fourth instar black, like the third, but labium reaching little beyond the hind coxae. Orifices, etc., as before.

The *fifth instar* is dark dull indigo blue; the abdominal sutures and submembranous parts blood red; the sterna medially and the labium partly, brownish yellow. Leg-hairs testaceous. Vertex more rounded and wider anteriorly than in the adult, also more concavely sinuate, while the head and pronotum are flush all along. (figs. 3-4). Head and nota aciculate. First segment of antennae not reaching to the apex of the vertex; second segment the longest, more than twice as long as the first and one-fifth longer than the third which is a trifle shorter than the fourth ([19]). Labium reaches just beyond the middle coxae. Sterna longitudinally sulcate. Tarsi all bisegmentate. Abdomen transversely striate above at least in the middle. Beside the usual orifices, there are a pair, widely separated, on the fourth tergite.

3 *Geotomus pygmaeus* Dallas.

This species is easily separated from the two preceding by the colour, minute size and bristly legs. The Cydninae, to which subfamily it belongs, are an offshoot of the Pentatominae. I can not give any information on the metamorphoses of this form, but suspect that the ova are dropped at the roots of small plants, and that the nymphs are to be found there or under stones, possibly in ants' nests. Mr. Swezey has found the adults under dried cow dung.

The present species has been described under eleven names

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(19) As in other hemipterous nymphs, abnormal segments occurs. Thus in one nymph in my collection, the two antennae are discrepant, one normal, the second segment in the other only half the length of its corresponding segment.

and is an immigrant into Hawaii. It is distributed over the entire Oriental Region, running into the Palearctic in Japan and China; it is also recorded from Celebes and New Caledonia.

Lygaeidae.

The ova in all cases known to me are of very similar form, i. e. "Kidney-bean shaped." *Myrmus miriformis* ([20]). *Dalader acuticosta* ([21]), *Anasa tristis* ([22]), *Leptocoris trivittatus* ([23]), etc., have been figured and with, generally, some nymphal instars.

The lifehistory of *Myodocha acuta* is also now fairly well known ([24]).

Like the Cimicidae, some Lygaeids are carnivorous, some phytophagous. They are subjected to the attacks of very similar parasites; *Lasa* is attacked by *Trichopoda* (a Tachinid), by *Telenomus* and *Hadronotus* (Hymenopterous egg-parasites) and by a bacterial disease. *Phyllomorpha laciniata* is remarkable for its stridulation and its mode of carrying its ova ([25]).

4 *Rhopalus hyalinus* Linneus.

This species is almost cosmopolitan and is firmly established in the Hawaiian Isles, though it must be a comparatively recent introduction, as Blackburn did not take it. Its principal food-plant is Pualele (*Sonchus oleraceus*) upon the young, closed, flowerbuds (and sometimes stems) on which the bright red eggs are laid in clusters. I have also found them on Ilima (*Sida cordifolia*) at sea level and Mr. Swezey records them from *Euphorbia cordata* and other plants. They have been reported from *Saccharum officinarum,* but they were certainly from clumps of *Sonchus* in the canefields.

In this species, as in *Nysius vinitor* and *delectus*, the male and female copulate end to end, both dorsal and horizontal. They can recopulate several times with the same partner.

(20) Leuckart 1855 Müllers Archiv.

(21) Annandale 1905 T. E. S. London, 55-9, Pl. VIII.

(22) Chittenden 1899 U. S. Div. Ent. Circ. (2) XXXIX, 1-5, figs. 1-3.

(23) Howard 1903 U. S. Div. Ent. Circ. (2) XXVIII, 1-3, fig. I.

(24) cf. (e. g.) Zehntner, 1901 Indisch. Nat., I 77-94.

(25) Bolivar 1894 Feuille Jeunes Nat. (3) XXIV 43-4; and many other references.

The *ova* are very similar in form to those of *Myrmus,* "Kidney bean shaped," that is, oval in profile, a little smaller at the micropyle end than at the other, subconstricted medially above. The micropyle end is obliquely truncate, one micropyle being on this truncate part, the other on the concave venter. The micropiles are similar to those of *Myrmus,* but the dorsoposterior apparatus in *Myrmus,* figured by Leuckart, is apparently not present in *Rhopalus.*

Colour testaceous, the vermilion-sanguineous embryo showing through and colouring the whole egg, (Micropyle colourless); when nearly ready for hatching they become dark crimson. They are deposited with the concave part downward, mostly on the involucres of the *Sonchus.* If undisturbed, the average number is 20 to 25 in each batch, but the same female lays more than one batch and recopulates after oviposition. Length a little less than one millimetre.

They hatch in about 6-7 days and the adult state is reached in 13-16 more.

The nymphal instars are remarkable for the gradual change of colour from blood-red in the first, to greenish-testaceous in the fifth.

First instar. The colour on hatching is pale sangineous, the head and nota darken in a little while and the whole bug darkens in a day or so. The bug is elongate, oval and flexible, two and four-fifths as long as the maximum width. The antennae are inserted on a line from the eye to the base of the labrum and are twice as long as the head in profile, their respective proportions being 6, 10, 11, 19; the first three are cylindric, the fourth slightly fusiform. The thorax and abdomen together are 3 2-3 longer than the head. The body and legs are furnished sparsely with dark bristly hairs. The eyes are not nearly contiguous with the pronotum. The labium reaches practically to the apex of the abdomen, or at least beyond the middle, its proportions being 12, 13, 12, 19. Width of head with eyes a trifle more than that of the pronotum. The legs are articulated almost at the lateral margins of the thorax and are widely distant. The second segment of the hind tarsi is twice as long as the first, scarcely so much in the fore and middle pairs. Arolia free, extending to about half the length of the claws, of which there are two on each tarsus, acuminate and slightly curved. Odoriferous orifices very small, transverse oval, situated on the apical margin of the fourth and fifth tergites.

Second instar very similar to the first, but the antennae are 2½ times as long as the head, 17, 15, 16, 26. The labium is only 5-6ths of the entire length, 15, 19, 12, 22. The pronotum is ½ wider than the length of the head.

Third and fourth instars not very dissimilar.

Fifth instar. Yellowish-green testaceous; a thin line of this from between the eyes to the base of the abdomen. Head speckled with blackish, and four greyish brown suffused spots at the base of the head behind the eyes; a thin black impressed line just inside the eyes, eyes pale redbrown. Antennae testaceous, apical three-fourths of the fourth segment greyish-fuscous, the rest of the antennae speckled with blackish-brown, sparsely blackly-pilose, as also the head and legs. Thorax and abdomen whitish pilose. Pronotum greyish-fuscous, except the lateral margins and the central line. Tegminal pads dark greyish fuscous, lateral margins pale. Legs yellowish testaceous, sparsely speckled with blackish-brown and red. Underside greenish testaceous, with coxae and trochanters. Tergites with 2 pale yellow spots on the middle of the 5th segment and 3 red spots. Orifices black.

Head about as long as across the eyes, somewhat declivous in front of them, scarcely so wide as the hind margin of the pronotum. Fourth segment of antennae as long as the maximum width of the head, first segment scarcely reaching beyond the apex of the head; 7, 12, 14, 22. Eyes not nearly touching pronotum, head narrowed in behind them. Bucculae very minute. Tylus extending beyond juga. Labium with the first segment not reaching to the base of the head, second touching the fore coxae, 4th segment reaching the hind trochanters. Pronotum about twice as wide as long; hind margin about a half wider than the anterior, slightly sinuate. Fore coxae subcontiguous, the others subremote.

Adult. When freshly emerged, the colour is pale opaque luteous, everywhere (except the tegmina) thickly speckled with crimson. Soon there begin to appear dark greenish specks, changing to black. Eyes pale maroon, ocelli red. Tegmina immaculate.

Rhopalus hyalinus is attacked by a chalcidoid egg-parasite, which is not yet named.

5 *Ithamar hawaiiensis* Kirkaldy.

This seems confined to Ilima (*Sida cordifolia*) as a food-plant. In the winter of 1903-4, it was plentiful, but not

knowing at that time the peculiarities of the coast region, I did not observe it particularly. The winters of 1904-5 and 1905-6 were so dry that almost no *Sida* flowered at Leiahi, and 1906-7 was little better. Lately, however, Mr. Swezey kindly brought me some empty egg-shells and 3 nymphs, so that I am able to present some few remarks on them. This bug is undoubtedly vegetarian.

Ova are deposited in patches of 5 or more on the underside of the leaf. The shape is more or less of the usual Lygaeid-form. Pale bronzy-golden when empty, a little infuscate at the dorsal constriction. There is no operculum, the anterior dorsal part being simply split open and off at the hatching. Reticulation microscopic, fine and rather superficial. Micropyles opaque white, much as in *Rhopalus*.

First nymphal instar. Whole body strongly furnished with black and with white bristly hairs. Head greenish testaceous, posteriorly piceous. Eyes red. Antennae, first segment greenish, the rest whitish, the second with a black ring near the apex, fourth with several rings. Thorax varyingly piceous. Legs whitish translucent, ringed with black. Abdomen pale greenish, tergites covered with white elongate papillae, blackly piliferous; also with one red papilla and two black, medianly. Orifices very small, blackringed.

Geocoridae.

The only Geocorid whose lifehistory is at all known is *Blissus leucopterus* ([26]). The ova are elongate oval, truncate at the micropyle end, with 4 micropyles. They are laid among the roots of grasses, about or below the surface of the ground. I have not found the eggs of *Nysius vinitor* here, nor has Mr. Froggatt succeeded in Australia. The lifehistories of *Scolopostethus pictus* ([27]) and *Stalagmostethus turcicus* ([28]) have been partially worked out. Most Geocorids seem to be phytophagous, but carnivorous forms are known.

Bacterial diseases attack the members of this family, but insect parasites seem rarer.

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(26) Webster 1898 Bull. U. S. Div. Ent. (2) XV, 1-82, figs. 1-19.

(27) Mjoberg 1906 Z. Wiss. Insektenbiol II 142-3, fig. 10,

(28) Townsend 1887 Ent. Amer. III 53-5.

Orthoea ([29])

The Hawaiian Isles now possess two immigrant species of this genus, both from the Australasian Region. *O. nigriceps* has been established here for at least 30 years, while *O. pacifica* has been here for scarcely more than a sixth of that time. This is interesting as showing that it is not impossible for some of the ancient endemic genera to be polyphyletic.

6 *pacifica* (Stal)

The adult is frequently attracted by 'light' and was first seen, I believe, at Waikiki in 1902 or 1903. It is common in Australia and Fiji. I have not yet found the ova, but have discovered the ultimate nymphs in my garden in Honolulu. They run quickly and occur in Maniania grass (*Cynodon dactylon*), though I do not think they feed on it.

Last nymphal instar. Black, the main area of the pronotum having a slight greenish metallic tint. Antennae coloured as in the adult, except that the first three segments are often suffused with blood-red; all four are only shortly and sparsely hairy. The vertex is without greyish pubescence. The first and fourth labial segments are blackish, the 2nd and 3rd yellowish testaceous, sometimes more or less fuscate. The mesonotum between the terminal pads is white, and the pads themselves are narrowly bordered externally with white. The underside is black, the pleurites both of tergites and sternites sanguinescent, and both dorsally and ventrally there is a large white opaque lateral spot a little apical of the apex of the tegminal pads. Legs yellowish-testaceous, fore femora, apex of middle femora, apical two-thirds of hind femora, apical two-thirds of hind tibiae, etc., blackish.

The head is as in the adult, but rather less convex and is wider between the rather smaller eyes, the vertex at base being one-half wider than the eyes together; the fourth segment of the antennae is formed as in the adult and is a trifle more than twice as long as third and three-fourths longer than the second, which is twice as long as the first. The labium is robust and reaches to the middle of the middle coxae. The first segment

(29) Distant's Oriental genus *Budaeus* is based on a nymph of *Orthoea* or a closely allied genus. Distant says his specimens are "apparently" nymphs; judging from his figures, there is not the slightest doubt.

is the longest, but does not nearly reach to the base of the gula, it is one third longer than the second and twice and two-fifths as long as the third which just reaches the base of the fore trochanters; the first segment is also nearly twice as long as the fourth. The pronotum is subconvex, narrowly reflexed laterally and wide so behind; there is a collar in front which narrows laterally. The collar and the hind lobe are separated from the polished main lobe by deep impressions. The hind margin of the pronotum is one tenth wider than the head and eyes, and two-ninths wider than the pronotum anteriorly. The pronotum is one half wider behind than its middle length, the main lobe being four times and four-fifths as long as the hind lobe, the lateral margins are not sinuate, the coxae are all nearly contiguous.

7 *Clerada apicicornis* Sign.

This bug is common in old houses, in neglected boxes, drawers, etc. I suspect that it feeds on *Lepisma* and perhaps on small Blattids.

Final nymph: Head brown, laterally dark fuscous, underside yellowish brown. Labium, sterna and legs yellowish-brown. Antennae dark fuscous, basal half of second segment paler, fourth yellowish white. Pronotum dark purplish piceous, scutellum, etc., paler, with a pale median line from apical margin of pronotum to hind angle of scutellum. The lateral margin of pronotum yellowish brown, the same parts as well as the posterior parts of the tegminal pads are brown, the rest of the latter dark fuscous. Abdomen sanguineous, the flaps blackish.

The head is similar to that of the adult, but the eyes are a little smaller. The form of the pronotum is very different, the lateral margins being reflected. The hind margins still more widely so. The pronotum is twice as wide at the base than at the apical margin, lateral margins slightly convexly rounded (not concavely sinuate). The labium reaches to the middle coxae, the first segment reaching to the anterior margin of the eye, the second not as far as the base of the head, the third to the middle of the fore trochanter. The third segment is the longest and is more than one-half longer than the first, a little more than twice as long as the second and is three times as long as the fourth. The antennae are four times as long as the pronotum, the second segment is about three-fourths longer

than the first, more than twice as long as the second, and a trifle longer than the fourth. There are three odoriferous orifices.

The nymphs like the adults, are conspicuous by the clear, whitish, last antennal segment.

Nysius Dallas.

This genus is evidently of considerable geologic antiquity, as it is not only very widely distributed, but has a number of undoubtedly endemic species on various oceanic islands. In these islands, however, outside the 14 described endemic species, there are three introduced species, viz., *coenosulus,* reported in 1859, *delectus* in 1878 and *vinitor* now recorded.

8 *vinitor* Bergroth.

This is a well known pest in Australia on 'vines' of all sorts, cherries and many other kinds of fruits and vegetables ([30]). In Hawaii, it is very common on Ihi (*Portulaca oleracea*) and has been reported from melon-vines.

I have not yet discovered the eggs, nor has any of the Australian Entomologists.

Fifth instar: Yellowish or greenish testaceous, vertex with 2 dark brown median straight stripes and 2 lateral (2 on each side) more irregular stripes, turning outwards apicalwards, also some obscurer spots or marks. Clypeus laterally bordered straightly with dark brown. Antennae pale fuscous, fourth segment a little darker. Nota and tegminal pads irrorated with dark and pale fuscous, a central pale line down the middle. Abdomen irrorated with reddish brown. Femora (except apically and basally) dark fuscous, rest of the legs pale. Labium reaching just beyond the hind coxae. Pronotum medially a little laminate. Fore coxae approximate, the others a little remote, though not much. Arolia rounded, free, shorter than the claws. Odoriferous orifice very short and wide, on the 5th tergite.

9 *delectus* F. B. White.

This is very close to the preceding but much larger. The nymphs are very similar, but proportionally larger in each

(30) See French, 1891,Handb. Destr. Ins. Victoria I 104, Pl. XII; and Froggatt 1901 Agr. J. N. S. W., XII, 352-6 Pl. [B].

stage. I have found them only on Kuku (*Bidens pilosa*), but commonly on that plant.

Metrarga F. B. White.

This is a curious genus of bark-dwellers, also found in such sheltering situations as Ieie (*Freycinetia arborea*) and under fallen leaves, etc.

10 *nuda* F. B. White.

The nymphs do not appear to be remarkable, but I have seen very limited material. Antennal tubercles acute and prominent; eyes not touching pronotum. Pronotum about 3 times as wide as long, the lateral margins laminate and minutely crenulate. Abdomen laterally sxplanate, odoriferous orifices elongate and very short, on fifth and sixth tergites.

Fam. Tingidae.

The metamorphoses of this family are a little better known, comparatively, than most of the other Heteropterous families. Many of the species seem to be gallmakers. *Maecenas pyri* produces three kinds of spots on leaves, (a) round spots, containing excrementa, these being very injurious; (b) raised spots, containing an egg in each, (c) minute punctures ([31]).

Copium cornutum forms galls in *Teucrium chamaedrys* ([32]). In other species, the eggs are deposited externally. Nymphal instars of various species have been described and figured by Felt ([33]), Heidemann ([34]) and Morrill ([35]), the latter figuring ova also.

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(31) Carlet 1882 C. R. Ac. Paris XCV, 1012.

(32) White 1877 E. M. M. XIII, 283; Rübsaamen 1895 Bull. Soc. Nat. Moscou 420, Pl. XV f. 8 & Pl. XVI f. 39.

(33) 1904, Bull. N. York Mus. LXXVI, 125, Pls. 3–4.

(34) P. E. S. Washington VIII, 10, f. 2–3.

(35) Psyche, 1903, X 127, Pl. 3.

11 *Teleonemia lantanae* Distant ([36])

This Tingid was purposely introduced from Mexico to check the *Lantana camara* and has already succeeded to a wonderful degree.

I have not seen the ova, but they are probably laid in spots raised on the leaf.

The last nymphal instar is, like that of most Tingid nymphs, spinose.

Suboval flat above or slightly concave, sternites convex. Testaceous, varying to yellowish-brown, the abdomen sometimes sanguineous, spines fuscous. Vertex with an apical porrect spine on each side of the middle and a median semierect one just behind; a sublateral semierect one near the eye on each side at the base. Labium reaches to the middle of the metasternum, first segment reaching the base of the head, second the apex of the fore coxae, third the middle of the mesosternum; the fourth segment is the longest, being one-fourth longer than the first, two-thirds longer than the second and twice and a half as long as the third. The bucculae, etc., as in the adult. The antennae are twice as long as the width of the fore margin of the pronotum, the third segment is twice as long as the fourth, which is more than twice as long as the second, first and second subequal The pronotum is five-sided and is about one-half wider than long, excluding spines. There is a semierect spine at the posterolateral angle. The tegminal pad has one semierect lateral spine near the apex. The hind femora are short, reaching to about half the length of the abdomen, the trochanters are all remote, though a trifle nearer to one another than to the lateral margins of the body. The tergites have 5 lateral semierect spines, and one medium spine near the apex, also 3 rows of smaller ones down the middle. These spines are almost all shortly hairy, and in addition there are smaller spines and capitate hairs scattered over the body. The sternites are convex. The length of the nymph is 2½ times as great as its width. The pronotum behind is about three-fourths wider than in front.

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(36) As Distant states that he has compared our Lantana Tingid with the types of *T. notata* and *subfasciata*, I have temporarily accepted his name, though his description is poor and based on inadequate material, and I cannot see how it is separable from *T. notata*.

Fam. Nabidae.

I formerly treated this as a subfamily of the Reduviidae, but the labial structure, the venation and the constitution of the abdominal segments, abundantly justify its rank as a separate family.

So far as known, the ova are inserted in slits made in leaves or stems ([37]) thus widely differing from the true Reduviidae.

The species are all presumably insectivorous; *Reduviolus lativentris* preys an the eggs of the butterfly *Pieris* ([38]), while *Arachnocoris* spp. live en famille with colonies of spiders, for what purpose is not quite clear ([39]). *R. innotatus* is an ally of the Sugar Planter.

Nesotyphlias gen. nov.

For the present, this may be briefly separated from *Reduviolus* by the absence of ocelli, by the clavus being fused with the corium, and by the minute membrane. Type *Nabis* (?) *lusciosus* White.

It is true that none of these characters by itself is sufficient to form a genus, but taken together and considered from the special aspects of the Hawaiian Fauna, I think the recognition of this and the allied species as a separate, well defined group of Nabidae is justified.

12 *lusciosus* (F. B. White.)

There are, I think, more than one species standing, in my collection, under this name. The nymphs are not remarkable. They have well-developed tegminal pads and are found on koa and ohia, on the lookout for prey.

Reduviolus Kirby.

In the "Fauna Hawaiiensis," I have fallen into confusion over three species. They are as follows:

(a) INNOTATUS Blackburn=*R. blackburni* Kirkaldy, an Australian immigrant (not Blackburn).

(37) Swezey 1905 Bull. Ent. H. S. P. A., I Pl. 17 fs. 1–4. Chapman 1906 Entom. XXXIX 73–4, Pl. 3.

(38) Marchal 1900 B. S. E. France 330-2.

(39) Scott 1881 E. M. M., XVII 272–4.

(b) BLACKBURNI White is a closely allied Australian immigrant.

c) KAHAVALU sp. nov.=*R. innotatus* Kirkaldy, an endemic Hawaiian form; (not Blackburn).

13 *R. innotatus* Blackburn.

This, as mentioned above, is the *R. blackburni* of Swezey's and my own writings. It is common on *Saccharum officinarum* and on Maniania grass (*Cynodon dactylon*), where it preys on Leafhoppers and other small game. The ova and one nymphal instar have been described and figured by Swezey (1905 Bull. Ent. H. S. P.A., I 235, Pl. 17. fs. 2-4). The habits of *R. blackburni* are probably similar.

Fam. Reduviidae.

The ova in this family, typically at least, are mostly provided with an ornamental cap of curious structure, which is pushed off on emergence. The metamorphoses are partially known in *Harpactor iracundus* ([40]) and ([41]) *Triatoma sanguisuga* ([42]), *Reduvius personatus* ([41]), *Endochus cingalensis* ([43]) and *Arilus cristatus* ([44]), as well as an unknown form described and figured from Brazil ([45]).

As in the other families, Dipterous parasites and Hymenopterous egg-parasites are known.

As is indicated by the form of the labium, this family is preeminently raptorial, but it has been stated that they are sometimes phytophagous, or rather sap-sucking. ([46])

14 *Zelus peregrinus* Kirkaldy.

This, as elsewhere remarked, may be the inadequately described *Z. renardii* Kolenati, from the Western United States, but I do not feel convinced.

It was first known in these Islands in 1897 and is now well

(40) Xambeu 1902 Le Nat. XXIV, 211.
(41) Leuckart 1855 Müller's Archiv. Pl. VIII, fs. 10-11 and 14.
(42) Howard 1900 Buli. U. S. Ent. (2) XXII 28, figs. 22-4.
(43) Sharp 1901 Cambr. N. H., VI, f. 272.
(44) Lugger 1900 Bull. Minnesota Agr. Sta. 69 p. 33, f. 25.
(45) Sharp 1892 T. E. S. London 191, Pl. VIII and Pl. IX figs. 4-8.
(46) Distant 1903 Faun. Ind., Rh. II 196.

distributed all over, the brown egg masses being at times conspicuous on *Hibiscus rosasinensis*, *Saccharum officinarum*, *Citrus*, etc.

It is a fiercely carnivorous bug, preying on Coccinellids, Leafhoppers, and in its younger stages, on Aphidae, so that it is as much injurious as beneficial from a human viewpoint.

The *ova* are cylindric, slightly curved, from about 1.2–1.5 mill. long, in masses of 20 to 40. They are castaneous with an opaque white operculum, the latter depressed within the margins. The micropyle is median and single. According to Swezey, who was partially studied this Reduviid ([47]) a female in captivity laid 269 ova. These are exceedingly sticky, as are also the legs, etc., of the nymphs. They hatch in 8 to 10 days.

Third (?) *instar* [possibly a young fourth]. Pale green covered all over white with granules, which are whitely piliferous. Antennae translucent whitish, (first segment green) with black and with white hairs. Eyes bronzy pink. A thin red line medio-longitudinally from the anterior margin of the pronotum to the base of the mesonotum. Legs whitish translucent, annulated with pale fuscous, pilose as are the antennae. Tergites thickly covered with white papillae which are whitely piliferous.

Fifth instar. Greenish testaceous, varying into pale greenish yellow or greenish white, or a tinge of bluish on the tergites. Hind area of head suffused anteriorly with orange red; 2 spots at the base of same area, 2 at base of pronotum, 2 anteriorly on mesonotum and 2 on its scutellum, the posterior margins of the tergites, etc., orange red. Eyes madder brown. Antennae greenish testaceous, the second segment lined longitudinally with blackish, third blackish-grey, widely annulated with white medianly, fourth pale fuscous. Tegminal pads partly fuscous. Underside greenish testaceous, with some orange-red marks on the abdomen and some blackish marks on the last three segments. Legs closely speckled with black, except the apical half of the tibiae and the tarsi (apex of apical segment of latter black); coxae and trochanters immaculate. Body almost glabrous, the antennae and the middle and hind legs sparsely hairy, the fore tibiae rather closely hairy. Antennae very slender, 18, 5, 16, 6. First segment of labium annuliform, second reaching scarcely to mid eye, third

(47) Bull. Ent. H. S. P. A., I, 232, Pl. XVI fs. 1–3 (1905).

reaching a trifle beyond the base of the head and fourth to the middle of the fore coxae. Pronotum widened posteriorly, hind margin convexly rounded. Anterior margin a little emarginate, the interolateral angle acute and prominent. Scutellum separated. Tegminal pads long and slender, prominently tuberculate anterolaterally (as also the wing pads). Prosterna sulcate, but not striated for stridulation, fore coxae almost contiguous. Meso-and metasterna not sulcate, apparently not divided, middle and hind coxae remote, the left from the right, the hind coxae articulated remote from the hind margin of the metasternum. Each of the tergites (except the apical) has a slender lateral spine which is an elongate tubercle on the first ones, but the last three are elongate, laterally porrect except the apical one (on the penultimate segment) which is oblique. According to Swezey, the whole nymphal period occupies 29 to 34 days.

Fam. Anthocoridae.

These bugs are probably mostly insectivorous, being fierce foes of Aphids, Chermids, Psocids, Bark-beetles, young leafhoppers, etc., though they perhaps also feed on minute fungi.

The only notes on their metamorphoses are those of Swezey ([48]), who has partially studied them.

15 *Triphleps presequens and* 16 *Physopleurella mundulus.*

The eggs are elongate oval with a raised collar at the micropyle end. They are deposited singly on leaves, etc.

Fam. Miridae.

The known ova are inserted, much as in Asiracids, in the leaves or stems of plants. The metamorphoses of *Poecilocapsus lineatus* ([49]) and *Helopeltis theivora* ([50]), etc., have been studied.

This family is mostly phytophagous, but some species are insectivorous, caterpillars, butterfly's eggs, aphidae, etc., forming their prey. *Miris dolabratus* has been reported as attacking a Dipterous adult, but it is scarcely credible, the bug having probably been really a *Reduviolus*. *Plagiognathus obscurus* is recorded as biting a human being.

(48) 1905 Bull. Ent. H. S. P. A., I 235, Pl. XVI fs. 4-7.

(49) Slingerland 1893 Bull. Cornell. Exp. Sta. [58] p 207, figs.

(50) Dudgeon 1894 Ind. Mus. notes III No. 5, p. 33, figs.

17 *Hyalopeplus pellucidus* (Stal)

Although only known so far from the Hawaiian Isles, this species is hardly an endemic form, and may be looked for in Australia or one of the Southern Isles. It is principally attached to *Hibiscus rosasinensis,* at least in the Lowlands.

The ultimate *nymph* is pale translucent greenish; the vertex has three purplish-red or sanguineous percurrent lines, (the outer ones sinuate) running obscurely onto the pronotum, there is also a lateral percurrent line on the gula. The antennae have the apical third of the second, third and fourth segments purplish-red (or pinkish or blood-red) and the rest is speckled with the same; the form is as in the adult. Labium with the apex dark fuscous. The head and antennae have black and yellow pilosity mixed, the nota and tergites have short black bristly hairs. Beneath there are golden yellow hairs. The hind femora and tibiae are sparsely speckled with red. The head is shaped much as in the adult, being about one-half wider than long, the vertex is wider than the eyes together. The second segment of the antennae is three times as long as the first and nearly twice as long as the third, also twice and two-thirds as long as the fourth. The labium reaches to the middle of the hind coxae, the first segment being one-third longer than the second and twice as long as the third, second and fourth subequal. The pronotum is a little longer than the head, and a little less long than its apical width, the hind margin is about two-thirds wider than the apical margin. The scutellum is rounded behind. There is one odoriferous orifice on the basal margin of the fourth tergite. The xyphus is angularly rounded behind, the coxae are subcontiguous.

Penultimate stage is very similar to the last, but of course the tegmina are less developed. The labium reaches nearly to the apical margin of the 2nd sternite, but the actual length is the same as in the last instar, as also the proportions, and it is the body which is shorter. The antennal proportions are practically as in the ultimate instar; the hind margin of the pronotum is scarcely wider than the apical, and is nearly one-half wider than its median length.

Fam. Tetigoniidae.

All known ova are inserted in leaves or stems. A general summary of the metamorphoses in this family is given in Bull. Ent. H.S.P.A. I. 274.

18 *Conosanus hospes* (Kirkaldy)

This is an Australian and Fijian species, first described from these Islands (as *Deltocephalus hospes*) where it is a comparatively recent immigrant. The 5th nymphal instar has been described and figured, as well as the long and short-winged adults ([51]).

Nesophrosyne gen. nov.

Allied to *Nephotettix,* but characterized by the venation. There is one large median subapical cell and a small exterior subapical cell, pedicellate at both ends.

Type *Eutettix perkinsi* Kirkaldy.

19 *perkinsi.*

A small whitish species found on Ilima (*Sida cordifolia*) at Leiahi, Kaimuki and elsewhere.

Fifth nymphal instar: ♂ creamy, eyes greyish; a sublateral spot on each side at junction of pro-and mesonotum, one at base of metanotum on each side, and one similarly near base and one near apex of abdomen, sometimes also a few specks, blackish. A short, suberect bristle sublaterally and a longer horizontal lateral one, on each tergite, also a number of long horizontal bristles apically, white. Leg bristles white. ♀ as above, but as a rule, immaculate.

The other stages are similar, except that the abdomen is extremely narrow.

Nesophryne gen. nov.

Allied to *Eutettix,* but the habitus is quite different, and the vertex much shorter, more declivous, with the eyes scarcely so wide as the transversely striolate pronotum.

20 *filicicola* sp. nov.

Tegmina brownish-yellow with fuscous veins, the cells sparsely irrorate medianly with brownish. ♂ valve pale; ♀ pygophor brownish yellow.

Length ♂ 5½, ♀ 6½ mill.

(51) Kirkaldy 1907 Bull. Ent. H. S. P. A., III Pl. I fs. 14-17.

Hab. Kauai, Kalihiwai, 400 ft., on fern (probably *Gleichenia dichotoma*)—Oct., Giffard.

Nymph of fifth instar pale brownish yellow, varyingly infuscate on the nota, a pale fuscous band across the bend of the head. Like the adult, but the head a little more produced, subangularly.

Hab. with the adult.

Fam. Poekillopteridae.

The metamorphoses of this and the two next families have been summarized by myself in Bull. Ent H.S.P.A. I. 277.

21 *Siphanta acuta* (Walker)

The metamorphoses have been partially studied by myself ([52]). This introduced species has now spread from the guava and coffee districts into the native forests, where it feeds on *Acacia koa* and other trees. It is parasitized by *Aphanomerus pusillus,* an introduced egg-parasite and attacked by a fungus.

Fam. Asiracidae.

Nesosydne gen nov.

Differs from *Delphacodes* and allied genera by the form of the tibial spur, which is solid, subcultrate, elongate, very narrow and armed with a few strong teeth. Arboreal. Type *koae* Kirkaldy.

22 *koae* sp nov.

May be at once distinguished from any other Hawaiian asiracid by the green color and long tegmina. There is a variety, (*rubescens*), found with it, suffused with pinkish. It is likely to be found on Oahu practically wherever *Acacia koa* occurs, but I am not sure of its distribution on the other islands.

Nymph in fifth instar is green (or suffused with pink) and resembles the adult in most particulars.

(52) Bull. H. S. P. A. III. Pl. VI figs. 17–20.

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

I

PART 5

(With Plate and Text Figures)

HONOLULU, APRIL 8, 1908
PRICE, 50 CENTS

FEB 15 1910

Hawaiian Entomological Society

Founded 1905

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Vice President.....O. H. Swezey
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* Original † Honorary.

JULY 5th, 1907.

The thirtieth regular meeting of the Society was held in the Entomological Laboratory of the H. S. P. A. Experiment Station, Mr. Swezey in the Chair.

Member elected: Mr. C. W. C. Deering.

NOTES AND EXHIBITIONS.

Bro. Matthias exhibited two specimens of a Conocephalid collected by himself in rushes near a pool in the vicinity of Wailuku, Maui, some twenty years ago. The species, undoubtedly introduced, is not recorded in the "Fauna Hawaiiensis," and has not been collected by anyone since.

Mr. Kotinsky read the following extract from a letter recently received from Mr. W. L. Distant: "In reply to yours of the 7th of May, I did examine *Teleonemia scrupulosa* Stål, before describing *T. lantanae*. The British Museum possesses a long series of Stål's species identified by Champion, after comparison with Stål's type or cotype. *T. lantanae* is a more elongate species differing principally by the shape of the discoidal area which is both more elongate and narrower than in *scrupulosa*, in other words the costal margin of the hemelytra is much less ampliated, rounded and sinuate."

Mr. Swezey exhibited specimens of a small black Cryptorhynchine weevil whose larvae bore in stems of Orchids and in the stipes of ferns. The specimens had been received a few days previous from Mr. E. D. Tenney, who had in turn received them from Mrs. Agnes Walker, Nuuanu Avenue, Honolulu. Mrs. Walker reported them very abundant among her ferns, coming up from the soil when she watered the ferns. Mr. Tenney has found them in stems and also in fleshy roots of Orchids in his orchid-house. He presumes that this weevil has been introduced in Orchids from the Philippine Islands, probably but a few years ago. It was two years ago that he called Dr. Perkins' attention to them in his orchid-house. Mr. Swezey reared them quite abundantly from the stipes of a fern (*Sadleria cyatheoides*), growing along the path on Pacific Heights Ridge, back nearly to the forest, in May, 1905.

Mr. Swezey also exhibited specimens of a large Tachinid fly (*Chaetogaedia monticola* Bigot), with the following note: "I recently reared quite a number of these Tachinids from pupae of

a native cut-worm (*Agrotis cinctipennis* Butl.). A considerable mystery is connected with the case, the facts of which follow. A cluster of 291 eggs of this moth were found on a mango leaf in Nuuanu Valley by Mr. Kotinsky, and turned over to me for rearing. Many of the young caterpillars died; but of those which attained full-growth and pupated, only 34 produced moths, while from 51 of the pupae Tachinids emerged. This Tachinid is very common and parasitizes all species of cut-worms, army-worms, and many other caterpillars. The mystery involved is this: How did this lot of caterpillars become parasitized? The eggs hatched in a breeding jar, and the caterpillars during all the time of their growth were enclosed, with no possible opportunity of being attacked by a Tachinid for the purpose of egg-laying. When about half-grown the caterpillars were divided into three lots (Mr. Kotinsky having one lot), and Tachinids bred out from each of the three lots. Questions remaining unanswered are: Were there Tachinid eggs somewhere on the food-plants (which were largely *Sonchus* and supplied from day to day) which hatched and the maggots attacked the caterpillars? Were there Tachinid eggs on the leaf with the cut-worm eggs? Were the Tachinid eggs deposited individually on the cut-worm eggs? It certainly appears as tho this Tachinid has a different method of ovipositing from others, so far as they are known, for they are always described as laying their eggs on the caterpillars. I have made some attempts at discovering the mode of ovipositing for this species, but so far with no success."

AUGUST 8th, 1907.

The thirty-first regular meeting was held in the Library of the Bureau of Agriculture, Mr. Swezey in the Chair.

NOTES AND EXHIBITIONS.

Mr. W. W. Froggatt (of the Dep. of Agriculture, New South Wales) present as a visitor, presented the following notes on Entomology, principally economic, in Australia. He opened his remarks by pointing out the variety of climate and topography of the continent, and the consequent variety of the insect fauna. In his work against injurious insects he emphasized the successful practice of cyaniding the trees, especially when the pests were

scale-bugs. His experience was that ladybirds suffered little from cyaniding because they were generally shaken to the ground in the course of mounting the tent, and as the gas rose, the ladybirds usually revived, flying away soon after the removal of the tent. In the apple orchards which are infested much by the codlin moth, spraying with lead arsenate is the common practice. Perhaps the most serious pest of the whole country is the comparatively recently introduced Mediterranean fruit-fly *(Ceratitis capitata)*, and the Queensland fruit fly *(Dacus tryoni)*. It has been recently discovered that kerosene oil is an irresistible attraction to the Mediterranean fly and the hope is now entertained that by trapping the flies with this oil, their ravages will be considerably checked. The oil, however, seems to have no attraction for the Queensland fruit-fly *(Dacus tryoni)*. In the fight against *Phylloxera*, the use of resistant stocks offers relief. The San Jose scale, at first very numerous and injurious to fruit-trees, is now kept well in check by a number of enemies, the most effective, perhaps, being a lepidopterous larva* described by Mr. Froggatt not long ago. The Chinese wax-scale *(Ceroplastes ceriferus)* frequently inhabits fruit-trees in large numbers, but it does not seem to have the poisoning effect upon plant tissues that the San Jose and other scales have. A wash composed of a couple of pounds of washing soda to a bucket of water is the most effective remedy so far used.

Mr. Froggatt then referred to the Linnean Society of New South Wales as an old and well established, and one of wealthiest organizations of the kind in the world. Our fellow members, Dr. Perkins and Messrs. Kirkaldy and Terry, are members of the Society. While it is not a strictly entomological society, the volumes published (now amounting to 32) contain a great amount of entomological matter. Though the Field Naturalist's Societies of Australia have a large membership, they are not confined to entomological work, and in entomology they limit themselves practically to life histories.

Speaking of his own mission around the world, which brought him to the Hawaiian Islands, Mr. Froggatt was proud to have been chosen by both the State Officials and Entomologists of four

* *Batrachedra sparsella* (Walker). Frogatt, Australian Insects, p. 280.—[Eds.]

of the Australian States, to represent them in a study of methods in economic entomology employed all over the world and principally upon means of subduing fruit-fly pests.

SEPTEMBER 5th, 1907.

The thirty-second regular meeting of the Society was held in the Library of the Sugar Planters' Experiment Station, Mr. Giffard in the Chair.

NOTES AND EXHIBITIONS.

Mr. Swezey exhibited a specimen of the wasp, *Pison iridipennis* Smith. He had observed this species very abundant at the Experiment Station H. S. P. A. this summer; whereas, he had not previously seen it on the island of Oahu. He had taken a few specimens on Maui, in 1906.* He was of the opinion that it must have recently rapidly increased in abundance.

Mr. Giffard exhibited several boxes of Cicindelidae and Cerambycidae, part of a large collection of North American (principally western) beetles he had purchased on the mainland. The collection contained about 8000 specimens, and 4000 species, determined by various specialists.

PAPERS READ.

Some Experiments in Breeding *Spodoptera mauritia* Boisd. for Color Variation.

BY OTTO H. SWEZEY.

A gravid female caught and placed in a breeding jar, October 15, 1906, deposited during the night 380 eggs on the cloth covering the breeding jar. The fact that there is somewhat of variation in shade of color in this species of moth, suggested the idea that here was a good opportunity to try some breeding experiments with color variation. These eggs hatched Oct. 20; about 100 attained full-growth and entered soil to pupate Nov. 10-15; 80 moths (43 males and 37 females) emerged Nov. 19 to Dec. 5.

* Later in September, found very abundant at Koloa, Kauai. Hence, is apparently well distributed in the group, altho I have found no records of it on Hawaii. (O. H. S.)

In carefully examining these moths, it could be seen that there was quite a little difference between the lightest and the darkest colored of each sex, and a close series in between. The males normally are lighter colored than the females.

From this lot of moths, pairs were selected for breeding. In each case, copulation took place and eggs were produced in one to five days. These hatched, and the moths were reared in the usual period of time.

Lot A.—A light-colored male and female. Only a few moths matured. There was nothing particularly striking about them, being about the average coloration. An attempt to breed a second generation was not successful.

Lot B.—This pair was a dark-colored female, and a light-colored male. 25 adult moths were reared. They were about normal as regards variation in color—both light forms and dark forms. From these a dark female and a normal male were selected for breeding. 36 males and 25 females were reared. The males were about normal color, but several were darker; the females were predominatingly of the darker form.

Lot C.—A pair of dark moths. From these, 22 adult moths were reared. Both sexes were predominatingly darker than the average normal. A pair of the darkest were mated, but with little success, only two females of their progeny were reared. These were very dark.

Lot D.—This was a very light-colored pair. From them 15 moths were reared. These moths were very light-colored compared with the average normal coloration. A pair were mated for further breeding. Only 2 adults were reared, and they were very light.

These experiments were necessarily interrupted, so that no more than two generations were reared; but the results from these indicate that after several generations of selected pairs of extreme coloration, one would arrive at widely different strains or varieties.

Some Coccidae From Singapore Collected by F. Muir.

BY JACOB KOTINSKY.

By courtesy of the Entomological Division of the H. S. P. A. I was privileged to examine the Coccidae sent by Mr. Muir from

the above locality. The following species were in the collection, Mrs. Fernald's "Catalog of the Coccidae" being followed in nomenclature.

Subfamily COCCINAE.

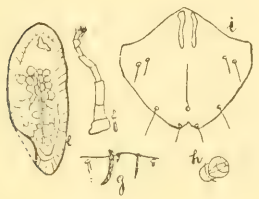
PULVINARIA sp.

Specimens labeled by Mr. Muir "Chinese white wax scale" are evidently a species of Pulvinaria, but in the absence of cottony sacks it is impossible to say what species it is.

COCCUS TUBERCULATUS, n. sp. (fig. 1, e-i)

Adult ♀ ochreous, median area in some specimens marbled with brown.

Eyes small, black. Form more or less oblong, acuminate at each extremity. Derm with raised reticulating lines forming a



Coccus tuberculatus, n. sp. *e*, ♀ *f*, antenna, *g*, stigmatic cleft and spines; *h*, submarginal tubercle; *i*, anal plates.

FIG. 1

tessellated pattern (fig. 1, e) as in *tessellatum*. The reticulation less distinct away from median area. Dorsal surface is coated with a delicate transparent waxy layer. Antenna (fig. 1, f) 8 jointed formula approximately 3, 4, (5,2), 8, (6,1), 7. Two conspicuous long spines behind each. Legs normal, tarsus half the length of tibia. Stigmatic clefts small and inconspicuous; spines three (fig. 1, g) the median nearly 4 times the length of others. Marginal hairs moderately long and fine, simple, pointed. Submarginal tubercles (fig. 1, h) in 26 groups or irregular rows of 3-5 to each side of body. Scales of anal operculum (fig. 1, i) broad; outer edge somewhat longer than base apical angle rounded. Large number of circumgenital glands arranged in semilunar group. Length about 4 mm. Breadth about 1.5 mm.

Habitat.—On leaves of unknown tree. Singapore (F. Muir

No. 244), 1907. Except for the numerous tubercles and a few minor differences this species seems a very close ally of *L. frontale*, Green.

Type material and slide in Entomological collection (No. 860) of the Hawaiian Board of Agriculture.

PARALECANIUM EXPANSUM (Green).

Green, "Coccidae of Ceylon," III, p. 235, Pl. LXXXVI, 1904. Several specimens apparently all collected at Singapore on several plants. But one of them bears Mr. Muir's No. (238), another is dated March '07.

This is a very large species (7.5 mm. long and 6 mm. broad). Mr. Green reports it also from Java and Queensland, so that the present is the first record of this species from the Malay Straits.

Subfamily DIASPINAE.

CHIONASPIS sp.

"On sugar cane, especially wild." Malay States. (F. Muir No. 260). Zehntner described four species of Chionaspis from sugar cane in Java. The accessible literature covers only two of these, and the present species is not either but may be one of the other two.

PHENACASPIS DILATATA (Green).

Green, "Coccidae of Ceylon," II, p. 148, Pl. LI.

Habitat.—"Batu Estate" (Malay?) on "Rubber." (F. Muir No. 262).

Note.—On leaves along side of *Asp. palmae*, tho less abundant.

ASPIDIOTUS (HEMIBERLESIA) PALMAE Morg. & Ckll.

Leonardi, Gen. e Spec. Diaspiti, Asp., p. 78, fig. 22, 1900.

"Batu Estate" (Malay?) on "Rubber" leaves, (Muir No. 262); Singapore on ?, March '07.

This insect was quite abundant on the specimen leaves collected by Mr. Muir. Externally it resembles *A. rapax* so closely that nothing short of a careful study of a microscopical preparation will determine its true identity.

In this connection it may be of interest to note that Mr. New

stead reports (Quart. Journ. Inst. Comm. Research Tropics, Liverpool Univ., Vol. I, No. I, p. 19, Jan. 1906), *A. cydoniae* Comst. upon rubber (Castilloa) from Nicaragua, C. America. This species is even more closely allied to *palmae* than is *rapax*, and were the determination made by a worker less careful than Mr. Newstead one would be inclined to doubt the authenticity of the name. *A. cydoniae* and its var., *crawii*, are quite common on these islands as is also a variety of rubber trees but so far this species has not been reported on rubber here.

PSEUDAONIDIA TRILOBITIFORMIS (Green).

Green, "Coccidae of Ceylon," I, p. 41, Pl. IV, 1896.
Food plant—unknown. Singapore (F. Muir No. 248).

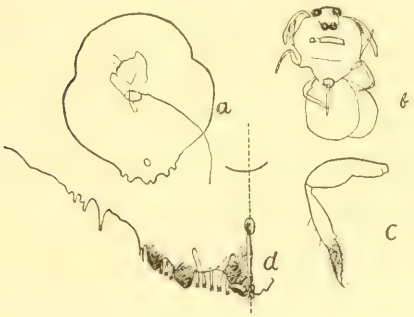
CHRYSOMPHALUS MINUTUS, n. sp. (fig. 2, a-d).

♀ *scale*.—Greenish yellow, subcircular, convex, diameter 0.65 mm. Exuviae sub-central, 1st orange, 2nd dark brown within white circle. Ventral scale complete except central opening, tough.

♂ *scale*.—Smaller, more elongate, with no appreciable ventral deposit.

♀.—Blood-red when dry. In balsam 0.450 mm. long by 0.42 mm. wide. Cephalic end more or less chitinised (especially in old specimens), broadly rounded; thorax separated from abdomen by lateral indenture. Pygidial termination quite broad, spaces between lobes unusually large, especially between median and second lobes (fig. 2, a). Three pairs of lobes: median pair united except distal third, quite broad, darker than the others, distinctly notched caudo-laterally, and terminating in an oval cavity; second lobe scarcely broader, minutely serrated, bearing about 5 teeth, oblique, separated from median by a space equal to combined width of two median lobes; third lobe about $\frac{2}{3}$ width of second, similarly shaped, bearing about 3 teeth to the serration, distance from 2nd only about $\frac{1}{2}$ of that between 1st and 2nd. Paraphyses distributed as follows: 2 are on median lobe pointing cephalad from cavity, the inner being $\frac{2}{3}$ length of outer; one more or less club shaped and much longer and stouter than first two is situated just lateral of median lobe and bears a small gland aperture, and a similar one at the inner base of the second lobe; one long fusiform paraphysis originates between the median

lobes and extends cephalad to and sometimes beyond anus. The paraphyses are peculiar in that they are unusually light in color and peculiar structually. The interlobal plates are 3-furcated about as long as lobes, there being apparently one between medians, 5 between 1st and 2nd, and 3 between 2nd and 3rd; several simple plates of varying length follow the last lobe. No circumgenital glands. A few minute dorsal pores scattered about the caudal margin of pygidium.



Chrysomphalus minutus, n. sp. *a*, ♀; *b*, ♂; *c*, leg of ♂; *d*, pygidium.

FIG. 2

♂.—Apparently not much different from those of other Diaspinae (fig. 2, b). Tarsi (fig. 2, c) very hairy, claw sharply pointed, digitules, knobbed.

Habitat.—On both sides of leaf of unknown plant. Singapore, (F. Muir No. 249) February, 1907.

Type slide and material in Entomological Collection (No. 853) of the Hawaiian Board of Agricultre. Cotype material also in author's collection.

OCTOBER 3rd, 1907.

The thirty-third regular meeting was held in the Library of the Bureau of Agriculture and Forestry, Mr. Giffard in the chair.

NOTES AND EXHIBITIONS.

Mr. Kotinsky exhibited a tube of both sexes of *Eucoila impatiens*, a few of which were decidedly less than one-half the size of the normal individuals. These were presumed to have come

from eggs laid in the larvae of the Horn-fly *(Haematobia serrata)*. They were bred from eggs laid by a female confined with 200 maggots in a jar about a month previously. In all, 29 females and 6 males issued from these larvae. As these numbers do not represent an average, it is not certain that they are normal. The metamorphoses of *Stomoxys* consumed about 14 days, those of *Haematobia* close on to three weeks; the larvae of the latter were more numerous in cow dung five or six days old than that three or four days old. In the latter those of the larger flies were more abundant.

PAPERS READ.

A Note On The Immigration of Hemiptera Into Oceanic Islands.

BY G. W. KIRKALDY.

The geographical distribution of Insects is now so greatly vitiated by interisland and intercontinental commerce, that the smallest record of immigration, showing whether it is natural or artificial, is of value.

At a recent meeting of this Society, exhibition was made of a Hemipteron, *Piezodorus rubrofasciatus* (Fabr.). This Cimicid has a very wide distribution, occurring in northern Australia, New Caledonia, Murua, Lifu, Fiji, Tahiti, Japan, the Philippines, Cochin China, India, Sumatra, Java, Abyssinia and Zanzibar, that is to say, it may be expected almost anywhere in the Australasian, Oriental or Ethiopian Regions, as well as in the Manchurian Subregion. It has not established itself in the Hawaiian Islands, at least it has not yet been found, but it is very interesting to hear that an example was detected and killed by Mr. Craw, while inspecting introduced plants, at the Port of Honolulu. It is pretty certain that *Piezodorus rubrofasciatus* would have become established here sooner or later, if systematic plant-inspection had not been enforced.

NOVEMBER 7th, 1907.

The thirty-fourth regular meeting was held in the Library of the H. S. P. A. Experiment Station, Mr. Giffard in the chair.

Member elected: Mr. W. Pfotenhauer.

NOTES AND EXHIBITION.

Mr. Giffard exhibited three specimens of the rare endemic Cossonid *Heteramphus hirtellus* Sharp, which he had taken in September on Tantalus, Oahu, at about 1800ft. elevation. The specimens were found on damp ground under decaying leaves.

Mr. Giffard also exhibited numerous specimens of the commoner *H. wollastoni*, *H. foveatus* and *H. filicum* taken on Tantalus at various elevations between 1200 and 2000ft. in rotting fern-stumps. The only remaining recorded Oahuan specimens of *Heteramphus* which he had been unable to collect so far, was *H. cylindricus*. This latter species has heretofore been common at the base of the leaves, and in the stems, of *Astelia*. It is of much smaller size than all the other species from Oahu.

Mr. Giffard also presented notes on *Coccinella repanda* Thunb. and *Coelophora inaequalis* Fab., in which he stated that Prof. Koebele claimed that the Coccinellidae which he sent to the Hawaiian Islands from Australia under the name of *Coccinella repanda* was in reality the typical *Coelophora inaequalis*. Until the orignal types (which are in Europe) of both the species referred to, have been examined, there will, however, continue to be a doubt as to which is which.

Mr. Giffard exhibited the following Coccinellidae, with notes on their introduction into the Hawaiian Islands by Mr. Koebele:

Serangium maculigerum Blackburn. Sent over from Sydney in 1894. Taken by Koebele in various locations of northern New South Wales, also Toowoomba and Brisbane. The northern species described from Cairns may be only a variety of the same.

Pentilia nigra Weise? Sent over from China and Japan during 1895, abundant on orange in both localities. First found in Honolulu, July 29th, 1896, on Myrtle and feeding on *Lepidosaphes beckii;* already numerous the same year; a valuable insect.

Scymnus notescens Blackburn. Introduced from Australia in 1894. Numerous on Aphids.

Sticholotis punctata Crotch. Introduced from Japan and China in 1894-5. Rather variable in both places.

Mr. Swezey exhibited the following specimens with notes:

Melittobia hawaiiensis Perkins. Described by Dr. Perkins in Pt. IV, Proc. Haw. Ent. Soc. Bred from material collected by Mr. Giffard; reared later on *Odynerus nigripennis*, *Sceliphron caementarium* and *Pison hospes*. Oct. 1907, I found a nest at H. S. P. A. Experiment Station of *Megachile palmarum*, in which several of the cells contained parasitized larvae.

Megachile diligens Smith. Collected previously by me at Napoopoo, Hawaii, 1 specimen. Several collected today at Waimanalo, Oahu. In the "Fauna," reported by Dr. Perkins as "rare" occurring on Oahu, Molokai, and Kona districts of Hawaii.

Scelipron caementarium (Drury). Oct. 19, 1907, at H. S. P. A. Experiment Station, one female with 3 males perched on top, one above the other, and each holding to the neck of the one below with its jaws. The lower one had no sexual connection. On a previous occasion 2 males were found similarly perched upon one female.

Notes on the Life-history of an Endemic Hemerobiid

(Nesomicromus vagus Perk.).

BY F. W. TERRY.

During a collecting trip up the local valley of Palolo last March, several eggs of this small Hemerobiid were found on the leaves of a composite which was infested with aphides. From these eggs several larvae hatched, from which adults were finally bred.* The young emerged Mar. 5th, '07., feeding readily on aphides of various species, becoming fully-fed Mar. 14th. They commenced spinning cocoons the following day, and pupated Mar. 16th, emerging as adults Mar. 24th.

The total period occupied from eggs to adult being about 3

* For description of the adult, *vide* Fauna Hawaiiensis II. pt. 2, pp. 37-38.

weeks; i. e., egg incubation period 3-4 days; larval period 10 days; pupal period 8 days.

Egg: Narrowly ovoid, non-stalked, non-sculptured, whitish-opalescent, .75x.30 mm.

Larva: Naked throughout its period, upon hatching, unicolorously pale-pink, 1.50 mm. long. The adult larva is elongately napiform and non-setose (this seems to be the characteristic form of those Hemerobiids and Chrysopids having naked larvae); dimensions, 7.50x1.50 mm. Head: small, flattened dorsoventrally, translucent, pale reddish-brown; antennae black, filiform, about 4 times the length of the head; palpi long, terminal joint long and moderately thickened, basal joints greyish-lutaceous, apical blackish; mandibles short, very little longer than the head, and much less curved than either Chrysopa or Anomalochrysa; pale reddish basally, darker apically, blackish madianly.

Body: Thoracic and abdominal segments brownish-testaceous, with a lateral row of irregular dark areas, forming from 1st thoracic to 5th abdominal segments a pair of irregular longitudinal chocolate-colored bands, with purplish shading around 1st. -3rd thoracic areas; 1st thoracic segment with lateral areas pale; abdominal segment 1-6 each with a lateral tubercle and pale lateral margins extending to segment 8. Segments 8-9 reddish-brown. Dorsal vessel conspicuous and blackish-brown. Legs moderately long, coxae and femora blackish, tibiae light-brown; claws normal, stalk of pedal sucker much shorter than that of Chrysopa or Anomalochrysa.

Pupa: Blackish and distinctly visible through the meshwork of the cocoon.

The cocoon is relatively large 6x3 mm., and composed of loosely-spun pale-yellow silk, the pupa lying freely within its spacious receptacle.

This insect appears to be common in the forests of the whole group.

DECEMBER 5th, 1907.

The thirty-fifth regular, and third annual, meeting was held in the Library of the H. S. P. A. Experiment Station, Mr. Giffard in the chair.

The Secretary announced the death of a member, Mr. E. H. Davis. An unanimous resolution of regret at the loss of Mr. Davis, and of condolence with his relatives, was passed by the Society. This was the first loss by death the Society had suffered.

The election of Offiers for 1908 resulted as follows:

President .....Mr. W. M. Giffard
Vice-President.....Mr. Otto H. Swezey
Sec-Treasurer.....Mr. Jacob Kotinsky
Additional members of Executive Committee..... { Mr. F. W. Terry / Dr. R. C. L. Perkins

NOTES AND EXHIBITIONS.

Mr. Giffard recorded the bee *Lithurgus* from Tantalus.

Presidential Address

BY W. M. GIFFARD.

The preparation of a Presidential address with some branch of entomological field or laboratory work as a subject may be an easy matter to the professional entomologist, and particularly so to one of that class which has had opportunities for an extended research in one or more of the various districts of these Islands; but it is quite another matter for the amateur like myself, who, under the most fortunate of circumstances, can devote on an average but one whole day per week to entomology of any kind, to address a Society of entomologists containing many members who have added lustre to the branch of science we serve. Whilst I feel greatly honored by the members of this Society electing me its President for the past fiscal year, and whilst I am at all times prepared to assist the interests of the Society in all respects, yet for the reasons above stated it is with great diffidence that I take

upon myself to deliver a Presidential address on an entomological subject in conformity with the precedent which seems to have been established by my respected and talented predecessor. Our By-Laws make it obligatory for the President to deliver an address at the Annual Meeting, and I have therefore decided that my subject on this occasion shall relate to a visit of 3½ days which I made recently to the Island of Lanai, during which short period barely one-half of my time could be devoted to collecting of insect fauna.

From the Rev. T. Blackburn's Résumé of his journeys and collecting on these Islands the following extracts are taken as descriptive of Lanai, and they may be considered serviceable for the purpose of this address. "This island (Lanai) lies due West of Maui from which it is separated by a Channel 9 miles wide. It is one of the smaller islands, having an area of only about 150 square miles. Its highest summit has an elevation of about 3,400 feet and the mountains occupy an unusually small proportion of area to the plains; moreover the forest is here less extensive and dense than in most parts of the Archipelago." * * * * "As a rule the insect fauna of the island appears to be closely related to that of Maui, but only a few of its insects seem absolutely identical with those of its neighbor; I feel compelled to regard them in general as species in course of acquiring complete isolation and therefore incapable of being treated as mere varieties. In the few patches of forest that I explored it appeared to me that insects were more plentiful than might have been expected."

Comparatively speaking I do not consider that Lanai is at present as rich in insect life as Hawaii, Maui, Molokai or Oahu. It was not considered so by Dr. Perkins some years ago when he spent quite a little time on the island investigating it entomologically. Mr. Blackburn's visit there was some years prior to that of Dr Perkins', and covered a period of one week only, during which he collected the following endemic and introduced beetles: *(See Trans. R. Dublin S. 1885.)*

Endemic	17	species
Introduced	18	"

Of the endemic beetles no Carabids, Rhyncogonids or Plagithmysids were taken by him.

Dr. Perkins during a longer visit to Lanai than any entomologist has ever made, records in *Fauna Hawaiiensis (1900)*

(as near as I can calculate) the following endemic beetles as having been collected by him on that Island.

CARABIDAE	6	species.	
CERAMBYCIDAE	1	"	
CURCULIONIDAE	18	"	five of these being generally distributed throughout the Islands.
SCOLYTIDAE	3	"	
PROTERHINIDAE	13	"	four of these being generally distributed on other Islands.
CIOIDAE *(Cis)*	10	"	five of these being generally distributed on other Islands.
CIOIDAE *(Apterocis)*	4	"	one being generally distributed on other Islands.

Since the above visits the forests and other local conditions of the Island have undergone a radical change for the worse, and it is easy to foretell what is in store in this respect in the future, should the depredations of goats and sheep on the little indigenous forest Lanai now possesses, be allowed to continue. Today the only forest on the Island worth mentioning is at the summit of the mountain called Haalelepakai which reaches an elevation of 3,400 feet. Its area I should approximate at about two hundred acres only, whilst my understanding from Dr. Perkins was that during the period of his visit, it extended over a much larger area. In this forest may be found a fair number of native trees such as Ohia-lehua (*Metrosideros polymorpha*), Pua (*Olea sandwicensis*), Naieo (*Myoporum sandwicense*), species of Straussia, Pelea, Lobelia, and Euphorbia, etc., together with the usual undergrowth of tree and other ferns, as well as occasional clumps of Ieie (*Freycinetia*). The condition as to deforestation referred to also extends to the sides of the valleys and gorges which are found on the upper sections of the slopes and plains that reach to the only mountain range on the Island. In olden times these valleys or gorges were well covered throughout with forest growth, but very little now is to be found unless one travels far into their innermost recesses. Barring, therefore, the small area of indigenous forest before mentioned, and the upper sections of some of the valleys referred to, the Island, as I found it, is of but little interest to the collector of endemic insects. I think it is possible, however, to secure today most, if not all, of the endemic

insects taken in the forest section by Dr. Perkins and Mr. Blackburn, but to do so one would have to remain in camp on the mountain for a more or less extended period, which, unfortunately, I was unable to do at the time of my visit. It is quite certain that unless the remnant of forest above referred to is immediately protected and preserved, in a short time it will entirely disappear as will also a very large number of the various species of endemic insects which have heretofore been collected there. It was this fact that induced me to take the present entomological conditions of Lanai as the subject of my address and I hope that now attention has been called to the condition that exists, some of the members of the Society will arrange to collect there in the near future.

The coast line of the island in places is now showing a dense growth of Algaroba, but the plains, slopes, plateaus and ravines are hopelessly bare of tree life except occasional clumps of wind-swept scrub Ohia-lehua and Pua in sheltered spots, or small groves of the native Pandanus, or, perhaps, a few occasional Kukuis *(Aleurites moluccana)*, Eucalypti or such trees where these marked the former wind breaks of human habitation. Cactus *(Opuntia)* and clumps of Agaves also dot portions of the plains whilst the slopes leading to some of the plateaus are covered with a dense growth of Aliimahu or Pukeawe *(Cyathodes tameiameiae)* as it is sometimes called. It it needless for me to say that none of these trees, plants or bushes are of very special interest to the collector of our endemic insect fauna. Moreover, domestic and other ants swarm everywhere except in the indigenous forest and these in themselves are sufficient to keep most of our endemic insects away from their neighborhood. On certain sections of the plains at about an elevation of 1,000 ft., I noticed an abundance of the native wild Ilima *(Sida fallax. var.)* in flower and at about 1,500 ft. elevation the introduced red-flowering Salvia *(Salvia coccinea)* was growing wild. This latter is probably an escape from gardens which if not eradicated will become a pest (if it has not already) as it is known to produce abortion in cattle. I have no doubt that had I had opportunity for a longer stay I might have taken from among these one or more species of other Aculeate Hymenoptera than those I collected. As it was, during a short hour I took *Odynerus insulicola*, *O. nigripennis* and one other species which may be *O. monas*. If not this, then it may

be a new species. In this neighborhood and at the same time I also collected *Nesoprosopis assimilans*.

Two and a half days of my time were spent at the Ranch house of the owner of the Island, which is situated at an elevation of about 1,800 feet at a section called Koele. The collecting I did was therefore of necessity confined to the larger valleys in that locality and more particularly to the sides of these, where, because of protection from the prevailing strong winds, there was still more or less native tree growth which was not wind swept. Of the *endemic insects* collected in these valleys at an elevation of 2,000 feet were the following:

† COLEOPTERA

PROTERHINIDAE	*Proterhinus deceptor* and *P. innotabilis** on Kukui and Ohia
CIOIDAE	*Cis calidus*, *C. porcatus* and *C. insularis* on Ohia.
CARABIDAE	*Colpocaccus tantalus var. lanaiensis* from under stones in creek.
CURCULIONIDAE	*Oodemas aequale* from dead Ohia twigs.

HEMIPTERA

(Heteroptera)

	GEOCORIDAE	(*Nysius saundersianus*)	
"	MIRIDAE	(*Sarona*)	2 species nov.
"	DO.	(*Psallus*)	1 " "
"	DO.	(*Tichorhinus kanakanus*)	
"	DO.	(*Kalania hawaiiensis*)	

(*Homoptera*)

DELPHACIDAE	(*Nesosydne*)	2	" "
JASSIDAE	(*Nesophrosyne*)	3	" "

All these were beaten off Ohia, Pua and Naio.

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* *Proterhinus innotabilis*, Dr. Perkins informs me, is a very variable species and may prove to include several.

† For the identification of the endemic Coleoptera I am indebted to Dr. R. C. L. Perkins and for that of the Hemiptera to Mr. G. W. Kirkaldy.

DIPTERA

Sarcophagid species.

ACULEATE HYMENOPTERA were not in evidence anywhere in this neighborhood, which is all the more surprising as bright sunny weather prevailed whilst on this particular collecting ground.

Of *introduced species* of insects I noticed in the vicinity the following:

COLEOPTERA

COCCINELLIDAE 3 species viz:
Cryptolaemus montrouzieri
Rhizobius ventralis and
Coelophora inaequalis or *Coccinella repanda*
Generally distributed but not in large numbers.

COCUJIDAE 1 species (*Psammaechus desjardinsii*) beaten from Kukui, Ohia, etc.

ANTHRIBIDAE 1 species (*Araeocerus fasciculatus*) beaten from Kukui.

STAPHYLINIDAE 1 species, similar to one of the foreign introduced species on Oahu.

HYDROPHILLIDAE 1 species, (*Hydrobius semicylindricus.*) Found under stones in creek.

MYCETOPHAGIDAE 1 species (*Litargus vestitus*) from Ohia.

TENEBRIONIDAE 2 species viz:
Opatrum seriatum and
Alphitobius lateralis
Both exceedingly common under stones and in matted grass everywhere on the plains and plateaus. Generally taken in company.

HYMENOPTERA

Chalcis obscurata Generally distributed in the neighborhood.

ORTHOPTERA

Species of Roach (*Polyzosteria soror*) exceedingly common in thick matted manienie grass.

Species of Gryllid (*Gryllus innotabilis*) also exceedingly common.

HEMIPTERA

(*Heteroptera*)

REDUVIIDAE	(*Zelus renardii=peregrinus*)
MIRIDAE	(*Hyalopeplus pellucidus*)
TINGIDAE	(*Teleonemia lantanae*)

The lantana Tingid (*Teleonemia lantanae*) is not thickly distributed so far as I could see, which fact is no doubt due to lantana, its food plant, being scarce on the Island. Lantana has never been a pest on Lanai which fact is no doubt due to the introduction, by a former owner of the Island, of Prof. Koebele's lantana insects some of which have the effect of preventing its spread. Its scarcity on the Island is most marked and during my 3½-day visit I never saw a plant of it although the owner of the Island informs me that he occasionally comes across a few small patches in remote spots.

The number of species of endemic insects seen and taken in the valleys mentioned, was very discouraging considering the hard tramping it was necessary to do in order to get over the ground, but a trip from the Ranch house to the summit of the mountain at Haalelepakai, which as I said before is at an elevation of 3,400 feet, is well worth making, even if it only allows one the opportunity for 3 or 4 hours collecting in any one day. This small forest section certainly seems more natural as a collecting ground for the entomologist, but even here the paucity of insect fauna is marked when compared to similar situations on some of the other Islands in the group. It is quite certain that if one intends to make a successful day of it there, one cannot afford to loiter on the collecting ground or en route. On the day I visited the mountain, Haalelepakai and the adjacent forest were enveloped in mist. This was varied with occasional showers of drizzling rain making collecting disagreeable, but for a third of the time, however, there were glimpses of sunshine during which I hoped to see some of the native Aculeates flying about. In this I was extremely disappointed and my visit to Haalelepakai in this respect produced the same result as was experienced in the valleys below—absolutely nothing of any kind on the wing other than the common blow-fly. I was more fortunate with other things, particularly with Coleoptera which ranks equally with Aculeate Hymenoptera

as my specialty, all other insects collected on my visit to this Island having been taken incidentally only. Amongst the *endemic insects* collected on Haalelepakai I will mention the following:—

COLEOPTERA

PROTERHINIDAE *Proterhinus lanaiensis*, *P. ineptus*, *P. ineptus var.*, and *P. innotabilis var.* from Ohia and other native trees.

CIOIDAE *Apterocis ephistemoides var.* from Ohia.

CURCULIONIDAE *Oodemas molokaiense* and *O. aequale* on Straussia, Ohia and other native trees (a pair of *Oodemas molokaiense* were taken "in cop.")
Rhyncogonus sordidus taken from moss on trunks of Straussia.

CARABIDAE *Thriscothorax filipes* taken from moss on Straussia.

NITIDULIDAE Two species of *Brachypeplus* from sundry native trees.

ORTHOPTERA

1 species of *Paratrigonidium* with a parasitic gordiid worm extending from abdomen.
1 species of native Roach *(Phyllodromia obtusata)*

HEMIPTERA

(*Heteroptera*)

NABIDAE	(*Reduviolus nubigenus*)	
MIRIDAE	(*Orthotylus*)	1 species
"	(*Sarona*)	2 " nov.
"	(*Nesiomiris hawaiiensis*)	
GEOCORIDAE	(*Nysius*)	1 species nov.

DO.

(*Homoptera*)

DELPHACIDAE	(*Aloha*)	2 " nov.
FULGORIDAE	(*Oliarus*)	1 " "
JASSIDAE	(*Nesophrosyne*)	1 " "

The only *introduced insects*, other than common flies, noticed in the forest section were 3 species of COCCINELLIDS viz: *Rhizobius ventralis*, *Scymnus vividus* and *Coccinella repanda* or *Coelophora*

inaequalis. The native CERAMBYCID (*Plagithmysus lanaiensis*) recorded by Dr. Perkins from this neighborhood I did not find although I spent a good deal of time seeking it. Either it was out of season in October or the damp atmosphere and lack of sunshine which prevailed on the mountain on this particular day prevented its appearance on the trunks of Ohia lehua to which it is supposed to be attached. It was taken by Dr. Perkins in the month of July, 1894.

The time I spent collecting and observing insects on Lanai was only what could be spared from a short visit to the Island made primarily for business, and I did not expect under such circumstances to either enlarge or enrich my collection to any great extent, yet it was with no ordinary pleasure that I made my quest in the virgin forest of Haalelepakai or the deep ravines of its slopes, and although not altogether successful as to the number of species of insects collected there, it was yet quite worth the trip to Lanai even if only to add to my collection of Coleoptera and Aculeate Hymenoptera some of the exceedingly interesting endemic species above enumerated. How much of novelty, interest, excitement, satisfaction and health such days of collecting can yield is surely only known to those whose lives seem too short to study a few species of the smallest, but not least interesting, of God's creatures.

The rapid disappearance of this virgin forest and that of other districts of these Islands should act as a bugle call to the members of this Society. The examination, classification and identification of specimens are matters that can be postponed, (although it is known that I am not favorable to delay in any branch of our work) but if collectors do not get into the field quickly the prizes nature now offers in some districts of these Islands may soon be withdrawn never, perhaps, to be offered again. We are with reason proud of the achievements of our entomologists in the local economic field: if some of the individual members of this Society fail to accomplish anything in pure science let the blame not be attributed to neglected opportunities. This Society now includes a number of enthusiasts who could not spend their leisure time better than in exploring every nook of a country "where every prospect pleases" and blessed with a climate so benignant that outdoor life is not only always possible but is a panacea for the ills that follow the cares of business and the indulgences of city life.

A Bibliographical Note on the Hemipterous Family Aleyrodidae

BY G. W. KIRKALDY.

In my recently published Catalogue of the Aleyrodidae, I noted on p. 103, that early this year, Tullgren had published a paper on this family, which I had not seen. The author has now favored me with a copy, and I can furnish the correct reference as "Arkiv for Zoologi III. no. 26, pp. 1-18, textfigs. 1-27. (March 6th. 1907.)"

A new genus, *Aleurochiton*, is formed, separated from *Aleyrodes* by the median vein of the tegmina being forked, and from *Aleurodicus* by the median vein of the wings being simple. The type is (*aceris* =) *acerum*. The other species discussed are "*Aleurodes*" *proletella*, *A. brassicae* & *A. fragariae*, all being well illustrated.

I take this opportunity of making some corrections &c. in my Catalogue:

p. 13. add: Britton "Some new" &c. no. 2. Ent. News XVII. 127-30. (April 1906).

id. no. 3. op. cit. XVIII. 337-42, Pls. XII-XIII. (Oct. 1907). (*)

p. 34. "The Aleyrodes of the Greenhouse" &c. is by Westwood, not Westhoff.

p. 56, line 4, for "Mexico" read "New Mexico".

p. 78, immediately under Nearctic Region, add "Connecticut, *acteae*, *coryli*, *fernaldi*, *forbesii*, *mori*, *morilli*, *packardi*, *waldeni*, *vaporariorum*."

p. 89, lines 28-9 for "*P. gratissima*" read "*P. persea*".

p. 103. add:

Quaintance, A. L. "The more important Aleyrodidae infesting economic plants," Bull. Tech. U. S. Ent. XII. 85-94, Pl. VII. & textfs. 23-4 (Oct. 21, 1907); *Aleyrodes howardi* sp. nov. on *Citrus aurantium*.

Rosenfeld, W. H. "The White-fly and its treatment," Circ.

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*With the following new species: *Coryli*, *waldeni*, & *morilli*; there are also new food plants, &c.

Louisiana State Crop Pest Comm. 18, pp. 1-18, textfs. 1-7. (1907).
p. 90. Psidium sp. add: *A. holmesii.*
p. 85. Anona sp. add: *A. mirabilis.*
p. 86. Bambusa, add: *A. bambusae.*
p. 87. Fragaria sp. add: *A. fernaldi.*
p. 89. Piper betle, add: *A. nubilans.*
p. 90. Pteris quadriaurita should be quadriolata.

A List of the Described Hemiptera (excluding Aleyrodidae and Coccidae) of the Hawaiian Islands,

BY G. W. KIRKALDY.

The Hawaiian Hemiptera are remarkable for the fact that they are represented endemically by the following families only, viz: Cimicidae, (probably), Lygaeidae, Myodochidae, Nabidae, Reduviidae, Anthocoridae, Miridae, and Acanthiidae, among the 26 recognized families of Heteroptera, and by the Tetigoniidae, Fulgoridae, Asiracidae and Chermidae only, out of the 14 Homopterous families: that is to say, 12 out of 40. These figures, however, do not really represent the true constitution of the Fauna, as, out of these 14, only 6 are represented by more than ten species each, viz: Myodochidae, Nabidae, Miridae, and the first three Homopterous Families. (‡)

The absence of Cicadidae, Cercopidae, Aradidae, Pyrrhocoridae, Tingidae, and Gerridae, so well developed in other parts of the Pacific, and the feeble representation of the mighty Cimicidae, Lygaeidae and Reduviidae, show, more plainly than many words, the real condition of the Fauna.

The leading characteristic of the Hawaiian Hemiptera is their tendency, and almost complete adaptation, to an arboreal life. All, or practically all, the Hawaiian Asiracidae—one of the most important families numerically—are arboreal, a phenomenon otherwise known, so far, only in one peculiar Australian genus, *Proterosydne* Kirkaldy. *Acanthia*, usually a riparian genus, has one species, representing, no doubt, the ancestral form, inhabit-

(‡) In calculating, I have taken into account a large number of manuscript species.

ing dry heaths in Europe; nowhere but in these Islands, to my knowledge, are there arboreal species.

Species marked * are known elsewhere, or are probably not endemic; those marked † are unknown to me, at present, with certainty.

Of the 174 species now recorded, 138 are considered endemic and 36 immigrant; the endemic genera number 31. Beyond this, however, the Coccidae and Aleyrodidae must be added, and I have descriptions of over 100 endemic species in manuscript and at least 100 more yet unworked, so that I do not think that I overestimate the total Hemipterous fauna, endemic and immigrant, at 500 species, of which about 360 would be endemic, the rest immigrant.

Family Cimicidae. (‡)

1. **Oechalia grisea** (Burm.) [=*patruelis* Stål.] I have noted (P. H. E. S. I. 141) that there are two types of *Oechalia*-ova here, but I cannot give details at present.

2. **O. pacifica** (Stål). It is possible that this is only a variety of *O. grisea*, as I made it at first, and that there is another undescribed species here.

Family Thyreocoridae.

3. * **Geotomus pygmaeus** (Dallas).

4. **Coleotichus blackburniae** (White).

Family Lygaeidae.

5. **Ithamar hawaiiensis** Kirkaldy. The type was from Molokai.

6. * **Rhopalus hyalinus** (Linneus).

(‡) *Piezodorus rubrofasciatus* has been recorded by Van Duzee (1905 Bull. Amer. Mus. XXI. 207), and *Carpocoris pudicus* var. *fuscispina* by Oshanin (1906 Yezh. Zool. Mus. Peterb. XI. Beil 113.), both certainly in error. *Eysarcoris insularis* Dallas (1851 List 228) from "Sandwich Islands" is either from Fate, (less correctly Vate), in the New Hebrides, or from Sandwich Island in the Bismarck Archipelago.

Family Pyrrhocoridae.

7. * **Dysdercus peruvianus** (Guerin).

Family (=Geocoridae) Myodochidae.

8. **Metrarga nuda** F. B. White. (‡)

This seems to be principally an Oahuan species. I have now only one Mauian example before me, which differs by the unicolorous pale red-brown tegmina, not chequered laterally. For the present, it may be termed var. **mauiensis**. The smaller dimensions given for *nuda* belong to the next species.

9. **M. obscura** Blackburn.

The genital characters separating this from *nuda* seem very slight, but some examples from Hawaii are distinctly smaller and darker, and seem to constitute a good species.

10. **M. contracta** Blackburn.

In the "Fauna Hawaiiensis" I described the ♂ labium as reaching to, or slightly beyond, the hind coxae, the ♀ labium as reaching to the base of the 4th sternite. This does not at all characterize the Oahuan specimens now before me, and must refer to the Lanai examples from Haalelepakai, &c., (which may then be termed *lanaiensis* sp. n.). In *contracta*, the ♂ labium reaches at least to the middle of the 6th sternite and to the middle of the ultimate one in the ♀. In both sexes, the first segment reaches the fore coxae.

var. **picea** nov. This has the pronotum, tegmina &c., fuscopiceous, the tegmina being rather obscurely speckled with pallid, which, however, is conspicuous on the dilated part. The underside is almost uniformly piceous, except the leg-annulations, &c. Hab. (of *contracta*) Oahu, Koolau range (? all over), on Ieie (*Freycinetia arborea*) and under fallen leaves &c. on the ground. In addition to the "Fauna Hawaiiensis" series, I have seen specimens taken by Messrs. Giffard, Swezey, Terry and myself.

M. contracta is so distinct structurally from the other species, that it forms at least a subgenus, which will probably be raised to

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(‡) The subfamily Metrarginae is, so far as is known, entirely Hawaiian. It has really little to do with the Cyminae, as I formerly supposed, and should probably be placed near the Oxycareninae. The spiracles of the last three segments open on to the sternites.

generic rank, should the Metrarginae be found elsewhere. **Nesoclimacias** is characterized as follows:

Corium laminately dilated, basal sixth strongly contracted; first segment of labium reaching to fore coxae; pronotum rounded anterolaterally; eyes subpedicellate, not extending laterally nearly so far as the anterolateral angles of the pronotum. Antenniferous tubercles less acute. Type *contracta*.

11. **M. (N.) lanaiensis** sp. nov.

I have temporarily given this name to the Lanai specimens determined by me in 1902 as *contracta*. Pl. V. f. 43a, so Dr. Perkins informs me, refers to this. Beyond the labial proportions, as to which I am uncertain, I can say nothing about this, except to point out the differences between the alar venation in this and *contracta*, which may, however, be the Artist's error.

12. **M. villosa** F. B. White

I form a new subgenus, **Nesocryptias**, for this, characterized as follows:

Corium not, or only slightly, contracted basally; first segment of labium reaching to base of head.

Antenniferous tubercles less acute; head and eyes much narrower than the pronotum anterolaterally, the latter rounded. Eyes sessile, small. Membrane small, not, or scarcely, extending posteriorly beyond the apical angle of the corium. Type *villosa*.

The typical subgenus, (type *nuda*) may therefore be characterized as:

Corium not, or only slightly, contracted basally; first segment of labium reaching to base of head. Antenniferous tubercles strongly acute; head and eyes reaching laterally about, or nearly, as far as the anterolateral angles of the pronotum. Eyes subpedicellate. Pronotum acutely spined anterolaterally. Membrane well developed.

13. ***Orthoea nigriceps** (Dallas)
14. **†O. vincta** (Say) [*periplanios* and *pacifica* Kirkaldy olim.]
15. ***Clerada apicicornis** Signoret.
16. **†Reclada moesta** F. B. White.
17. **Sephora crinigera** (F. B. White).
18. **Nesocymus calvus** (F. B. White).
19. **Nesomartis psammophila** Kirkaldy.
20. **Nysius ochriasis** Kirkaldy.
21. **N. saundersianus** Kirkaldy.

22. **N. kamehameha** Kirkaldy.
23. ***N. coenosulus** Stal.
24. ***N. delectus.** F. B. White.
25. ***N.** sp?. [*vinitor* Kirkaldy olim].
26. †**N. arboricola** F. B. White.
27. †**N. blackburni** F. B. White.
28. †**N. dallasi** F. B. White.
29. †**N. longicollis** Blackburn.
30. †**N. mauiensis** Blackburn.
31. †**N. nemorivagus** F. B. White.
32. †**N. nitidus** F. B. White.
33. †**N. pteridicola** F. B. White.
34. †**N. rubescens** F. B. White.
35. †**N. vulcan** F. B. White.
36. †**N. whitei** Blackburn.
37. ***Merragata hebroides** F. B. White.

Family Tingidae.

38. ***Teleonemia lantanae** Distant.

As Distant's description was practically useless, and as I felt uncertain of the distinction of this species from *T. notata* Champion, I sent specimens to Dr. Bergroth, who is the greatest living general authority on the Heteroptera. Dr. Bergroth confirms it as a good species and tells me that it is to be distinguished at once from *T. bifasciata* and *notata*, by having the antennae very conspicuously pilose (not indistinctly and almost microscopically so), by the cellules of the costal membrance (*costal area* Champion) being broad, almost subquadrate (not oblong and very narrow), and by the cellules of the costal (*subcostal* Champ.) area being transverse (not oblong). These points are omitted by Distant, but are the fundamental characters of the species.

Family Nabidae.

39. **Reduviolus kahavalu** Kirkaldy.

I think this should form a new subgenus, **Nesomachetes,** characterized by the almost straight lateral margins of the pronotum and consequent feeble elevation of the hind lobe, by the immaculate scutellum and non-annulate antennae and legs. The hamus of the wing arises from the connecting vein, almost at its

junction with the subtended vein. It is apparently nearest to *Reduviolus* in sp.

40. **R. sharpianus** Kirkaldy.

41. ***R. blackburni** F. B. White.

42. ***R. innotatus** F. B. White.

43. **R. tarai** Kirkaldy. The type was from Lanai.

44. **R. subrufus** F. B. White, (only fig. 37 in the "Fauna".)

45. **R. morai** Kirkaldy. The type was from Kauai, and was figured (No. 39) on Pl. V. The hook (fig. 39a) belonged to another species, from Lanai.

46. **R. koelensis** Blackburn.

47. **R. oscillans** Blackburn.

48. **R. arrogans** sp. nov.

(=Reduviolus subrufus Kirkaldy 1902 l. c. (part)).

♀. Of the general form of *subrufus*. Brownish-yellow, more or less infuscate on head and pronotum. Tegmina mostly, but irregularly, suffused with blackish, the ground color reddish-brown. Abdomen above mostly blackish. Beneath brownish-yellow (except pleurites). Middle and hind femora with an indistinct subcastaneous annulation near the apex. Membrane ashy testaceous, veins ashy-brown. Apex of second segment of antennae black.

Length 12 mill.

Molokai, (June 9th, 1893, Perkins).

49. **R. truculentus** sp. nov.

(=Reduviolus subrufus Kirkaldy 1902 l. c. (part.), Pl. V. f. 38*)*.

♀. Pale ashy yellowish, marked with fuscous, as in the figure in the "Fauna Hawaiiensis". Membrane ashy testaceous, veins ashy brown.

Length 10½ mill.

Oahu, Honolulu Mts., on Mamake *(Pipturus albidus)*.

50. **R. nubigenus** sp. nov.

(=R. morai olim part.*)*.

Differs from *morai* by the very different appearance of the membrane which is rather thickly spotted with greyish fuscous, the veins being rather indistinct. The form is much shorter and broader.

Length 7½ mill.

Lanai, Haalelepakai; also, I think, from Maui, Haleakala; and Molokai.

51. **R. kaonohiula** sp. nov.

(=*R. tarai* part.)

Much like *tarai*, but the ♂ hook is very different, and the pronotum is distinctly more constricted submedially.

Length 8½ mill.

Hawaii, Kilauea, (Dec. 1904) on the Hilo Road, about 2 miles from the Volcano House.

This is a little variable in intensity of coloring, fully matured individuals being very red, with deep black base and centre to the scutellum. The second segment of the antennae is feebly, if at all, fuscous apically.

Nymph (ultimate): not specially noteworthy except that the apex of the second segment of the antennae is black.

52. **R. montivagus** sp. nov.

(=*R. tarai* part.).

Allied to *tarai* and *kaonohiula*, but the hind lobe of the pronotum is proportionately broader, and the pleura and sternites are immaculate orange yellow.

Length 8½ mill.

Kauai, Waimea Mts.

53. **R. lusciosus** (F. B. White) * (Pl. 5. f. 35 only of "Fauna").

54. **R. silvicola** sp. nov.

(=*R. lusciosus* pt. olim).

Scarcely to be distinguished from *lusciosus*, but the membranal venation is different and the ocelli more distinct.

Length ♀ 10½ mill.

Molokai.

55. **R. monticola** sp. nov.

(=*R. lusciosus* pt. olim).

A single ♀ in indifferent condition seems to be different from *lusciosus*. It is smaller and darker, the median line being thicker and darker, and distinctly trifurcate behind on the pronotum. Scutellum dark fuscous except two yellow spots. Sternites not sharply bicolorous, but confusedly fuscous.

Length 7½ mill.

Oahu, Waianae Mts., lee side, 2000–3000 ft.

* *Nesotyphlias* should not be regarded as a genus, but rather as a natural group produced by special circumstances. See p. 155.

56. **R. procellaris** sp. nov.
(=*R. lusciosus* pt. olim).

♀ yellowish-brown, the central line piceous, thick, forming into 5 on the hind lobe. Gula and genae blackish. Tegmina yellow-brown, blotched and spotted (especially inwardly) with blackish-brown, hind margin of corium very irregularly sinuate. Legs more darkly spotted than in preceding three, coxae mostly black. Abdomen dark fuscous, or blackish, ventrally paler down the middle; pleurites yellow-brown, marked with black.
Length ♀ 9½ mill.
Molokai, 4,500 ft.

57. **R. volcanicola** sp. nov.
(=*R. lusciosus* pt. olim).

Distinguished by the tegmina reaching to a little more than the middle of the abdomen; they are narrow, and angularly rounded apically.

The ♂ is fig. (no. 34—hook, 34a) on Pl. V. of the "Fauna"
Length 8 mill.
Hawaii, Kilauea.

58. **R. curtipennis** (Blackburn).

59. **R. paludicola** sp. nov.
(=*R. lusciosus* pt. olim).

Distinguished from all the other brachypterous forms by the very convex anterior pronotal lobe, and from all, except *lolupe*, by the multiannulate first segment of the antennae and very short tegmina.

Anterior lobe of pronotum 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 ♂ 10 mill., ♀ a little less.
Molokai, 4,000 ft.

60. **R. lolupe** sp nov.
(=*R. lusciosus* pt. olim).

Close to the last, but larger, pronotum much less convex, tegmina shorter, and legs less darkly mottled.
Length ♀ 10¼ mill., max. width 3¼ mill.
"Kauai? Molokai?"

61. **R. silvestris** sp. nov.
(= *R. lusciosus* pt. olim).

♀ Brownish-yellow of various tints: a central line from base of clypeus to posterior angle of scutellum blackish, doubling on anterior lobe of pronotum, momentarily interrupted on the middle of the pronotum and widening at the posterior angle of the scutellum. Head laterally dark fuscous; antennae brownish-yellow, the second segment a little longer than the first. Hind third of pronotum with an outwardly oblique, obscure fuscous line on each side. Tegmina pale purplish brown (veins mostly thick and yellowish), specked on the corium, especially on the exterior half, with purplish-fuscous. Membrane smoky, veins dark smoky. Abdomen mostly blackish, a broad brown yellow stripe down the sternites medialy.
Length 8 mill.
Kauai 4,000 ft.

62. **Milu kerasphoros** Kirkaldy.
(= *Reduviolus rubritinctus* Kirkaldy olim = *Milu kerasphoron* Kirkaldy 1907 Can. Ent. XXXIX. 248.)

Head, collar, anterior lobe of pronotum, posterior margin of pronotum (more darkly), scutellum, &c., more or less reddish-purple or red-brown. Gula and sterna blackish. First, third and fourth segments of antennae and apex of second, labium &c., yellowish-brown; second segment of antennae yellowish, apex of fourth black. Scutellum blackish medianly or anteriorly. Tegmina ashy-yellow, irregularly speckled with pale brown on the clavus; veins on apical half of corium sanguineous. Just about the cross vein there is a fuscous suffusion across the tegmina, and the outer area is darkly speckled, forming a rather distinct pale reddish-fuscous band across. Apical angle of corium reddish-fuscous. Membrane greyish-testaceous, with ashy veins. Legs yellowish-brown, more or less faintly speckled. Hind femora rather obscurely annulate apically. Abdomen above mostly dark fuscous, beneath yellowish-brown (sometimes infuscate). Pleurites yellow-brown, incisures more or less fuscous. Head a trifle longer than the first segment of the antennae. Antennae 4.7½. 7. 4. Labium reaching nearly to the middle coxae. Fore femora two and a quarter times as long as the head, five and a half times as long as maximum width.
Length 9½-10 mill.

Oahu, practically all over the Koolau range from the forest level upwards, but not common.

var. **purpurea** nov.

The entire upper surface, excluding the membrane, is more or less suffused with purplish. It occurs apparently with the type-form.

63. **M. ? rubritinctus** (Blackburn).

Blackburn does not mention the curious horns on the head, but the incrassation of the antennae indicates its probable position in this genus.

Family Gerridae.

64. * **Microvelia vagans** F. B. White.

65. * **Halobates sericeus** Eschscholtz.

Family Reduviidae.

66. * **Alloeocranum biannulipes** (Montrouzier).

67. * **Zelus renardii** Kolenati (=*laevicollis* Champion and *peregrinus* Kirkaldy).

I am indebted to Dr. Bergroth for the information that *peregrinus* and *laevicollis* are the same species.

68. * **Triatoma rubrofasciata** (de Geer).

69. **Nesidiolestes selium** Kirkaldy.

70. **N. insularis** sp. nov.

This differs so much from my description of *N. selium*, that I fear there is some mistake therein. I cannot refer now, however, to the unique type of the latter.

N. insularis differs by the pronotum not being constricted (!), and by the metanotal spine being subacute. The fore femora are nearly twice as long as the coxae, and much longer than the tibiae and tarsi together. In profile the head is much higher on the anterior lobe than on the posterior; eyes small. Head and thorax dorsally brownish-testaceous, more or less obscurely variegate. The abdomen, and the insect laterally and ventrally, piceous; base of abdomen above brownish, &c. The antennae, femora and tibiae are brownish and testaceous in rings.

Length (? ♂) 9 mill.

Oahu, Tantalus 1,800 ft. (O. H. Swezey).

71. **Luteva insulicola** sp. nov.
(=*L. insolida* Kirk. pt. olim).

Differs from *L. isadas* Kirkaldy by the different pattern and color; from *L. insolida* White by the larger size, different tegminal pattern, form of tegminal areole, &c. Dark testaceous, more or less suffused with fulvous. Eyes black. Antennae dark fuscous. Sternites blackish-brown, laterally testaceous. Fore legs not annulate; hind femora and tibiae dark fuscous, the former apically, and the latter basally, white; the tibiae paling towards the apex, which with the tarsi is testaceous. Tegmina fuscous hyaline, each area more or less broadly margined with hyaline; exterior margin narrowly sanguineous. Wings hyaline, exterior margin partly sanguineous. Head a little more than twice as long as high, eyes large, occupying nearly all the height of the head. Pronotum longer than metanotum. Median areole of tegmen elongate, about half of the tegmen, widening after the middle, posteriorly acute-angled.
Length 9 mill; length of hind tibia and tarsus 15 mill.
Oahu, Waialua.

72. **L. insolida** F. B. White.

73. **Ploiariodes whitei** F. B. White.

I suspect I have lumped some good species.

74. **P. rubromaculata** Blackburn.

I think there may be some good species lumped by me here.

75. †**P. pulchra** Blackburn.

Fam. Anthocoridae.

76. ***Triphleps persequens** F. B. White.

77. ***Physopleurella mundulus** F. B. White.

78. **Lasiochilus denigratus** (F. B. White).

This is known only from Hawaii, Mauna Kea, 3000 ft.

79. **L. decolor** (F. B. White).

I think this is a good species. It occurs in the Koolau range, Oahu.

80. **L. silvicola** sp. nov.
(=*L. denigrata* pt. olim).

Differs from *denigratus* by the scutellum being unicolorous sooty. The antennae have the first segment brownish-fuscous, second and third darker, fourth paler. Tegmina unspotted.
Length 3¾ mill.

Kauai, Koholuamano.

81. **L. montivagus** sp. nov.
(=*L. denigrata* pt. olim).

Distinguished by the maculate tegmina and by the lateral margins of the pronotum being less strongly rounded anteriorly. Clavus with a broad line near the base (by the scutellum), the clavo-corial suture, and a spot on the cuneus, yellowish-brown. Length 4 mill.

Lanai, Koele Mts. I think that it is the same species that is found in Olaa and Hilo (1800 ft.).

82. **L. nubigenus** sp. nov.
(=*L. denigrata* pt. olim).

Smaller than *montivaga* and the markings are paler and much more obscure; also the membrane has three small pale basal spots, and a large one apically.
Length 3⅛ mill.
Maui, Haleakala, (5000 ft.).

83 **Nesidiocheilus hawaiiensis** Kirkaldy.

84. †**Buchananiella sodalis** F. B. White.

85. †**Lilia delecta** F. B. White.

Family Clinocoridae.

86. ***Clinocoris lectularius** (Linneus).

Family Miridae.

87. **Sulamita opuna** Kirkaldy.

88. **S. lunalilo** Kirkaldy. The type was a specimen from Kilauea, Hawaii.

89. **S. dryas** sp. nov.
=*S. lunalilo* var., Pl. IV. f. 12 (Faun. Haw.).

90. **S. oreias** sp. nov.
=*S. lunalilo* brachypterous form, Pl. IV. f. 13. This cannot be the brachypterous form of *lunalilo*, as the vertex is longer, antennae shorter, &c.

91. **Psallus sharpianus** Kirkaldy. The type was a Kauaian specimen.

92. **P. pelidnopterus** Kirkaldy (as var. of the previous).

93. **Tichorhinus** (=*Orthotylus*) **perkinsi** Kirkaldy. The type was from Kilauea, Hawaii.

94. **T. iolani** Kirkaldy. The type was from Kilauea, Hawaii.

95. **T. kanakanus** Kirkaldy. The type was also from Kilauea, Hawaii.

96. **T. kekele** Kirkaldy.

97. **T. daphne** Kirkaldy. The type was from Waianae, Oahu.

98. **T. kassandra** Kirkaldy (as var. of *daphne*).

The type was from Kilauea, Hawaii.

99. **O. azalais** Kirkaldy. The type was from Makaweli, Kauai.

100. **Koanoa hawaiiensis** Kirkaldy. The type was from Lanai.

101. **Kamehameha lunalilo** Kirkaldy. The type was from Waianae, Oahu.

102. **Cyrtopeltis hawaiiensis** Kirkaldy.

103. **Nesidiorchestes hawaiiensis** Kirkaldy.

104. **Opuna hawaiiensis** Kirkaldy. The type was from Oahu.

105. **Pseudoclerada morai** Kirkaldy. The type was from Molokai.

106. **P. kilaueae** sp. nov.

=*P. morai* var. (Faun. Haw., Pl. IV. f. 19). This has nothing to do specifically with *morai*, the eyes being much smaller, and the pattern and coloring quite different.

Hawaii, Kilauea.

107. **Sarona adonias** Kirkaldy. The type was from Kilauea, Hawaii.

108. **Kalania** (=*Baracus*) **hawaiiensis** Kirkaldy.

109. ***Hyalopeplus pellucidus** (Stal).

110. **Oronomiris hawaiiensis** Kirkaldy. The type was from Waianae, Oahu.

111. **Nesiomiris hawaiiensis** Kirkaldy. The type was from Olaa, Hawaiii, and was marked by mistake "*N. kekele.*"

111a. ***Fulvius** sp. (near *oxycarenoides*). Kauai, on sugarcane fields.

111b. ***Halticus chrysolepis** Kirkaldy.

Family Acanthiidae.

112. **Acanthia exulans** (F. B. White).

What I suppose to be this species is rather rare on Oahu, N. W. Koolau range, and Waialua Mts. A specimen from Kauai, 4000 ft., is very close but, I think, distinct.

var. **molokaiensis** nov. Very similar to the typical form, but

the pale color is browner, and the dark tint more suffused. It is probably a good species.

Length 5 mill.

Molokai Mts.

113. **A. oahuensis** (Blackburn).

I suppose that the Tantalus (Oahu) species, taken by Perkins, Giffard and Terry, is this, but I should scarcely have described the fourth segment of the antennae as thickened; at least it is not noticeably so in fresh specimens, nor is it very appreciably shorter than the third.

114. **A. humifera** sp. nov.

(=*Acanthia oahuensis* Kirkaldy olim. (pt.)).

Closely allied to the last, but the tegminal picturation is different, and the second segment of the antennae is rather longer in proportion. The lateral margins of the pronotum are also rather more sinuate.

Black; a few, pale, obscure, ferruginous specks on the head, and a pale speck at the apex of the clavus. Corium pale yellowish-ferruginous, irregularly and rather sparsely marked and blotched with brown and blackish-brown. Clypeus and base of first segment of antennae yellowish-brown, rest of antennae dark fuscous. Femora brownish-yellow, medially fuscous, tibiae testaceous; fore tibiae slightly fuscous medially, extreme apex blackish. Antennae 15. 38. 22. 21.

Length 3-3¼ mill.

Oahu, N. W. Koolau range: specimens from Maui (Haleakala, 3000 ft.) and Hawaii (Kona, 2000 ft.), I think are distinct, but I do not care to describe them on the material before me.

115. **A. nubigena** sp. nov.

(=*Acanthia oahuensis* Kirkaldy olim. (pt.)).

Of the size and form as *oahuensis*, but the pronotum is regularly roundedly divergent towards the base, and the antennae are much shorter and stouter. Clavus pale yellowish-brown, exeept basally. Corium the same color, and practically unspotted, but the venation is dark, and rather broadly colored. Legs yellowish-brown, slightly infuscate in part, but not noticeably marked. Antennae scarcely reaching to the middle of the scutellum, when turned back, 4. 11. 10. 11.

Length 2⅞–3⅛ mill.

Maui, Haleakala, 5000 ft.

116. **A. procellaris** sp. nov.
(=*Acanthia oahuensis* Kirkaldy olim. (pt.)).

Similar to the last, but the antennae are longer, and the tegminal picturation different.

Black; clypeus and first segment of antennae pale brownish-yellow, rest dark fuscous. Clavus black, a brownish-yellow spot near, and one at, the apex; corium brownish-yellow, veins broadly dark, exterior mostly dark fuscous, except the lateral margins &c. Legs pale, scarcely infuscate. Antennae reaching at least to the posterior angle of the scutellum, when turned back, 9. 32. 25. 20.

Length 3½ mill.

Molokai, 4000 ft. Specimens from Maui, Iao Valley, and from Lanai 2000 ft., scarcely differ from this.

Family Corixidae.

117. * **Arctocorisa blackburni** (F. B. White).

Family Notonectidae.

118. * **Buenoa pallipes** (Fabr). This is the "*Anisops sp?*" of the "Fauna."

Family Membracidae.

119. * **Centrotypus (?)** sp.?

A recently introduced form, of which Dr. Perkins showed me a specimen, was probably a species of this genus.

Family Tetigoniidae‡.

120. **Nesophrosyne perkinsi** (Kirkaldy); see textf. 3.

121. **Nesophryne filicicola** Kirkaldy, from *Microlepia strigosa* not *Gleichenia*, as erroneously stated (P. H. E. S. I. 161).

122. **N. kukanaroa** Kirkaldy.

123. **N. kaiamamao** Kirkaldy.

‡ *Bythoscopus peregrinans* (not "*peregrinus*" as erroneously written in the "Fauna"), *B. viduus* and *Tetigonia varicolor* must be expunged from the Hawaiian list.

124. * **Conosanus hospes** (Kirkaldy).

Family Poekillopteridae.

125. * **Siphanta acuta** (Walker).

Family Fulgoridae.

126. **Iolania perkinsi** Kirkaldy. The type was from Kilauea, Hawaii.

127. **Oliarus tamehameha** Kirkaldy.

128. **O. kanakanus** Kirkaldy. The type was from Kilauea, Hawaii.

129. **O. hevaheva** Kirkaldy. The type was from Kona, Hawaii.

130. **O. tarai** Kirkaldy. The type was from Waianae, Oahu.

131. **O. morai** Kirkaldy (as var. of *tarai*). The type was from Molokai.

132. **O. opuna** Kirkaldy.

133. **O. orono** Kirkaldy.

134. **O. koanoa** Kirkaldy. The type was from Kona, Hawaii.

Family Asiracidae

The genera of Asiracidae in Hawaii may be distinguished as follows:

1. Tibial spur not strongly compressed, often tectiform or sublaminate, or three-sided; spines many and feeble.... ...(2)

1a. Tibial spur strongly compressed, polished; spines few and strong .....(4)

2. Antennae subcylindric.....(3)

2a. Antennae flattened and widened 3 *Perkinsiella* Kirkaldy.

3. Frontal keels fused into one, almost at the base of the frons. ..... 2 *Kelisia* Fieber.

3a. Frontal keels fused about the middle of the eyes..... .....1 *Peregrinus* Kirkaldy.

4. Head normal.....(5)

4a. Head produced in front, so that it is longer than the rest of the body..... ..... 9 *Dictyophorodelphax* Swezey.

5. Frons with two keels, sometimes almost obsolete..... (6)

5a. Frons with the keels fused into one almost at the base (7)

6. Tegmina not reticulated..... 4 *Aloha* Kirkaldy

6a. Tegmina reticulated ..... 7 **Nesorestias** gen. nov.

7. Very slender, frail forms..... 8 **Nesodryas** gen. nov.

7a. Robust forms ....(8)

8. Frons not speckled..... 5 *Nesosydne* Kirkaldy

8a. Frons speckled ..... 6 **Nesothoe** gen. nov.

135. **Nesosydne koae** Kirkaldy (with var. **rubescens**). The genitalia are figured on Pl. 4. f. 2.

136. **N. leahi** (Kirkaldy).

137. **N. ipomoeicola** (=*pulchra* Stal). Genitalia figured on Pl. 4. f. 4.

138. **N. pipturi** sp. nov. (Pl. 4. fig. 3).

Easily distinguished by the smooth, wide, somewhat polished frons, with scarcely raised keels, and by the green nymphs.
Length 1 7/8-2 1/8 mill.
Oahu, on Mamake *(Pipturus albidus)*.

This and the other species will be described at length later on; in the mean time, these diagnoses and the figures will be sufficient to discriminate them.

139. **N. halia** sp. nov. (Pl. 4. f. 8.).

♂ pale luteous; frons, pronotum and scutellum (except generally between the keels) dark fuscous. Tegmina with 3 apical cells, not nearly reaching the apex of the abdomen.

♀ similar to the ♂ but larger; the keels paler.
Length 3-3 7/8 mill.
Oahu, Koolau range.

140. **N. palustris** sp. nov. (Pl. 4. f. 7.).

Sordid brownish-yellow, the scutellar keels darker. There is no continuous subapical line, and the clavus is not completely sutured off from the corium. There are 4 apical veins, the subcostal cell being acute apically. The male pygophor is characteristic, having the "lip" acuminately produced.
Length 3 1/2-3 3/4 mill.
Molokai, 4950 ft. and 4500 ft, on trees in the excessively wet bogs on the highest points.

141. **N. chambersi** sp. nov. (Pl. 4. fig. 10-12).

Yellowish or pale ferruginous. Tegmina subhyaline, veins mostly concolorous with the prominent, brown granules.

Length 3 1/2 mill.

Hawaii, Kilauea, 4000 ft.

I have much pleasure in naming this after my friend Mr. W. E. Chambers, who has kindly drawn the accompanying figures for me.

142. **N. raillardiae** sp. nov. (Pl. 4. f. 5.).

Greenish-yellow, immaculate.

Length 3 mill.

Hawaii, Kilauea, 4000 ft., on *Raillardia*.

143. **N. argyroxiphii** sp. nov. (Pl. 4. f. 6 & textf. 1).

Black; keels of head and nota, a broken very narrow line down the middle of the abdomen, &c., testaceous. Tegmina subopaque, milky, veins fuscous. There are no apical cells, and the tegmina do not reach to the middle of the abdomen.

Length 3 mill.

Maui, Crater of Haleakala, on *Argyroxiphium sandwicense*.

144. **N. nephrolepidis** sp. nov. (Pl. 4 f. 1.)

Not unlike *ipomaeicola* and *halia*, but the tegmina are brownish-hyaline and the whole aspect is darker. The genitalia easily distinguish it.

Nesodryas gen. nov.

Somewhat allied to *Megamelus* Fieber, but the basal segment of the antennae is shorter than wide, not more than one-fourth of the length of the thickened second; the hind tibiae are distinctly longer than their tarsi, and the first segment of the latter is more than twice as long as the others together; tibial spur solid, elongate, narrow, with 5-7 strong spines. Veins of tegmina feebly granulate; 5 apicals, the 2nd. and 3rd. with common stalk, 4th forked near apex. Type *freycinetiae*.

1. Vertex and pronotum each with a couple of small, but conspicuous, dark fuscous spots. . . . . (Oahu) 145 **freycinetiae** sp. nov.

1a. Vertex and pronotum immaculate, pale . . . . . (2)

1b. Vertex pale, pronotum dark smoky. . . . . (Oahu) 146 **elaeocarpi** sp. nov.

2. Pale greenish-testaceous, tegmina milky-colored. . . . . (Oahu) 147 **giffardi** sp. nov.

2a. Pale brownish-yellow; tegmina greyish hyaline, tegmina yellowish hyaline with the interior half pale orange-brown (or yellow-fumate) . . . . . (Oahu) 148 **eugeniae** sp. nov.

Nesothoë gen. nov.

Corresponds somewhat in the "laminate spur" series to *Chloriona*. Beyond the spur, it differs by the sudden compres-

sion of the tegmina at the base of the apical cells, the stronger excavation of the vertex, the union of the frontal submedium keels closer to the base of the frons. In all the species, the frons is marked transversely more or less clearly with pale, broken lines and spots. Type *fletus*.

The species, pending full description, are separable as follows:

1. First segment of antennae blackish or dark fuscous (or if pale, then the second is blackish) ..... (2)

1a. Antennae pale ..... (6)

2. Frons basally dark with pale markings, apically white..3.

2a. Frons pale brownish-yellow with whitish specks and a whitish suffused blotch in the middle; tegmina brown with a broad white basal band and an exterolateral crescent of the same hue (Maui) ..... 149 **fletus** sp. nov.

3. Vertex and pronotum white; tegmina immaculate (Kauai) ..... 150 **hula** sp. nov.

3a. Vertex and pronotum pale yellowish or brownish; tegmina maculate ..... (4)

4. Apical third of tegmina not maculate, some of the veins narrowly suffused ..... (Hawaii) 151 **frigidula** sp. nov.

4a. Apical third of tegmen irregularly suffused, at least one of the cells smoky ..... (5)

5. Tibiae whitish, clearly annulate with brown .... (Oahu) 152 **bobeae** sp. nov. (‡).

5a. Tibiae brownish-yellow, feebly annulate .... (Oahu) 153 **perkinsi** sp. nov.

6. Apical part of tegmen not blotched with brown ..... (7)

6a. Apical part of tegmen blotched with brown ..... (9)

7. Tegmen with an oblique band near the base ..... (8)

7a. Tegmen only suffusedly smoky... (Maui) 154 **laka** sp. nov.

8. Larger, tegmina milky ..... (Molokai) 155 **piilani** sp. nov.

8a. Tegmina not milky, face more clearly spotted apically... ..... (Oahu) 156 **terryi** sp. nov.

9. Second segment of antennae four times as long as the annuliform first ..... (Kauai) 157 **pluvialis** sp. nov.

9a. Second segment of antennae less than three times as long as the non-annuliform first ..... (Lanai) 158 **silvestris** sp. nov.

(‡). A tegmen is figured, textfig. 2.

Nesorestias gen. nov.

This may be distinguished from the other solid- spurred forms by the two obscurely indicated keels on the frons; the tegmina are very short and rounded apically, closely but rather obscurely reticulated.

159. **N. filicicola** sp. nov.

♂ pitchy black; abdomen apically (more or less), antennae, labium, legs, &c., brownish-testaceous. Tegmina dark yellowish-brown, a small obscure black spot at the apex of the clavus.

♀ dark yellowish-brown; antennae, labium, legs, &c., brownish-testaceous. Tegmina yellowish-brown, a small obscure spot at the apex of the clavus.

Length 4 mill.

Oahu, Tantalus, on ferns.

160. **Peregrimus maidis** (Ashmead).

161. **Perkinsiella saccharicida** Kirkaldy.

162. **Aloha ipomoeae** Kirkaldy (Pl. 4. fig. 9.).

163. **Dictyophorodelphax mirabilis** Swezey.

Family Chermidae

164. **Hevaheva perkinsi** Kirkaldy.

165. **H. monticola** sp. nov.

Pale greenish-yellow, frons fuscous on the middle of the cones. Ocelli red. Pronotum with two or three pale fuscous bands down the anterior half, dorsulum broadly pale fusco-olivaceous laterally. Tegmina hyaline, veins yellowish-white, an irregular broad smoky band reaching from the exterior margin along the "subcosta" to the union of the 3 main veins and past that of the other side, broadening on the anal cell; near the union of the main veins forking almost at right angles and continuing irregularly to the apex of the lower fork of the brachial. The veins on the apical third are smoky and suffused, and are more or less connected by a transverse smoky line. The veins are hairy. Wings hyaline, veins brokenly smoky. Antennae with scattered hairs. Length ♂ 2, ♀ 2¾ mill; expanse of tegmina ♂ 9, ♀ 10½ mill.

Oahu, Tantalus, 2000 ft. (Perkins, Oct.)

I have seen only a carded pair of this pretty little form, Kindly lent to me by Dr. Perkins

166. **H. silvestris** sp. nov.

Dark olivaceous-brown; legs &c., brownish-testaceous. Tegmina concolorous, subhyaline, veins opaque. Wings more hyaline.

Length to apex of closed tegmina 2 mill.

Oahu, Tantalus, 2000 ft. (Perkins).

I know of this sombre little species only a single specimen kindly lent to me by Dr. Perkins.

167. **Trioza iolani** Kirkaldy. This forms galls on Ohia lehua *(Nani (=Metrosideros)* sp.?) on Tantalus, Palolo, and Konahuanui ridges, from 1200 ft. upwards. The type was from Kauai.

Family Aphidae

168. **Aphis rosae** Linneus.

169. **Loxerates sacchari** (Zehntner).

170. **L. brassicae** (Linneus).

171. **Myzus citricidus** Kirkaldy.

172. **Myzocallis kahawaluokalani** Kirkaldy.

My thanks are due to Dr. Perkins for much information relative to type and type localities. I have examined the collections of Dr. Perkins and Messrs. Terry, Swezey and Giffard, and tender these gentlemen my thanks. N. B. nos. 111a & 111b, included after the manuscript was completed, bring up the total to 174.

The new species &c. described in this paper are as follows:

Metrarga **lanaiensis** sp. nov.

M. contracta var. **picea** nov.

M. nuda var. **mauiensis** nov.

Nesoclimacias subg. nov. of Metrarga.

Nesocryptias subg. nov. of Metrarga.

Nesomachetes subg. nov. of Reduviolus.

Reduviolus **arrogans** sp. nov.

R. **truculentus** sp. nov.

R. **nubigenus** sp. nov.

R. **kaonohiula** sp. nov.

R. **montivagus** sp. nov.

R. **silvicola** sp. nov.

R. **monticola** sp. nov.

R. **procellaris** sp. nov.

R. volcanicola sp. nov.
R. paludicola sp. nov.
R. lolupe sp. nov.
R. silvestris sp. nov.
Nesidiolestes insularis sp. nov.
Luteva insulicola sp. nov.
Lasiochilus insulicola sp. nov.
L. montivagus sp. nov.
L. nubigenus sp. nov.
Sulamita dryas sp. nov.
S. oreias sp. nov.
Pseudoclerada kilaueae sp. nov.
Acanthia exulans var. molokaiensis nov.
A. humifera sp. nov.
A. nubigena sp. nov.
A. procellaris sp. nov.
Nesodryas gen. nov.
N. freycinetiae sp. nov.
N. elaeocarpi sp. nov.
N. giffardi sp. nov.
N. eugeniae sp. nov.
Nesothoë gen. nov.
N. fletus sp. nov.
N. hula sp. nov.
N. frigidula sp. nov.
N. bobeae sp. nov.
N. perkinsi sp. nov.
N. laka sp. nov.
N. piilani sp. nov.
N. terryi sp. nov.
N. pluvialis sp. nov.
N. silvestris sp. nov.
Nesosydne ipomoeicola sp. nov.
N. pipturi sp. nov.
N. halia sp. nov.
N. palustris sp. nov.
N. chambersi sp. nov.
N. raillardiae sp. nov.
N. argyroxiphii sp. nov.
N. nephrolepidis sp. nov.

Nesorestias gen. nov.
N. filicicola sp. nov.
Hevaheva monticola sp. nov.
H. silvestris sp. nov.
A total of 3 genera, 3 subgenera, 3 varieties and 51 species.

EXPLANATION OF TEXT FIGURES

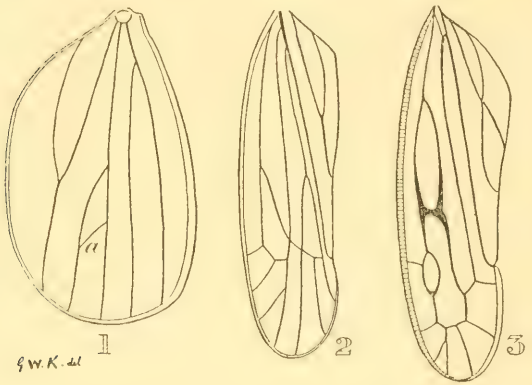
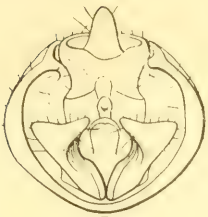


Fig. 1. Tegmen of *Nscosydne argyroxiphii*; "*a*" is sometimes absent.
Fig. 2. do., *Nesothoe bobeae*.
Fig. 3. *Nesophrosyne perkinsi*.

EXPLANATION OF PLATE 4.

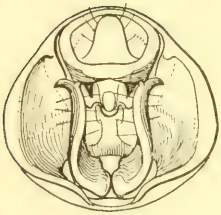
1. *Nesosydne nephrolepidis*, male pygophor.
2. *N. koae*, do.
3. *N. pipturi*, do.
4. *N. ipomoeicola*, do.
5. *N. raillardiae*, do.
6. *N. argyroxiphii*, do.
7. *N. palustris*, do.
8. *N. halia*, do.
9. *Aloha ipomoeae*, do.
10. *N. chambersi*, do.
11. *id.*, left & right tegmina, showing variation in the same specimen.



1
x 60

2
x 66

3
x 76



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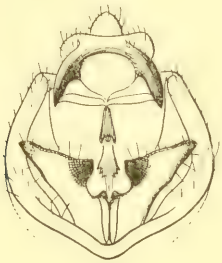

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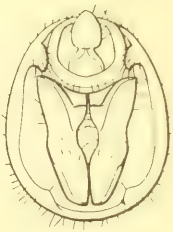

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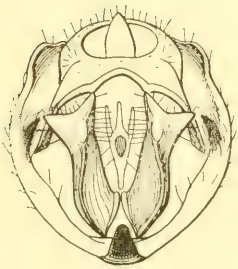

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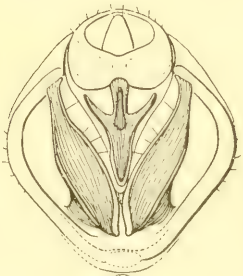

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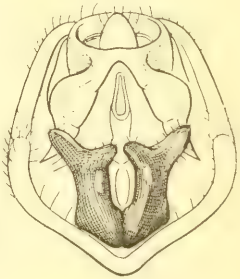

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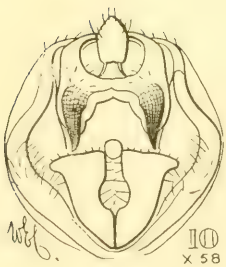

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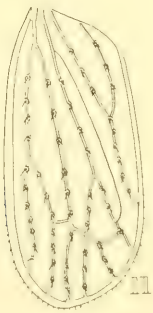


11

12

KIRKALDY—ON HEMIPTERA OF HAWAIIAN ISLANDS

DECEMBER 12th. 1907.

A special meeting was held in the Library of the Bureau of Agriculture, Mr. O. H. Swezey in the chair.

Mr. W. A. Bryan delivered an address, in which he outlined the organization of the "Pacific Scientific Institution," which has been incorporated for the purpose of making a scientific Ethnological and Biological exploration of the Islands of the Pacific Ocean.

The following resolutions were carried by the Society:

Mr. W. A. Bryan having presented a paper outlining the aims, scope, organization and work of the Pacific Scientific Institution to members and guests of this Society at a Special Meeting held December 12th, 1907; and in view of the importance to the Society of the subject he discussed and the comprehensive interesting manner in which he presented it, be it

RESOLVED, that we, the Hawaiian Entomological Society and other scientists of Honolulu hereby express our appreciation of the courtesy thus shown us. Be it also

RESOLVED, that realizing the great importance of this Institution we take the opportunity now to endorse heartily this Institution which Mr. Bryan has so ably planned and to extend our congradulations to him for the success already achieved and our most earnest wishes for the further success of the Institution. Be it further

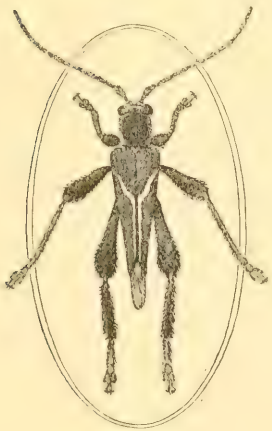
RESOLVED, that these resolutions be spread on the minutes of the Society as a permanent record of such recognition, and that a true copy of them be presented to Mr. Bryan.

Callithmysus koebelei sp. nov.

BY R. C. L. PERKINS.

Reddish brown, the prothorax above being darker than the elytra or legs, clothed with sparse pale pubescence. Furcate pubescent lines of the elytra slender, pale yellowish, distinct. Antennae clear testaceous. Behind the antennae the head has very large and shallow, but not dense, punctures; the pronotum above appears bare on the large subovate dark area, already mentioned, though in reality it bears extremely short black hairs; at the sides it has a pale pubescence and is finely punctate, the punctures becoming much less numerous towards the sternum, with the surface smooth and shining. The elytra are densely and rugosely punctate throughout. Middle and posterior femora with conspicuous black hairs apically, generally more or less mixed with some white ones at the tip; hind femora with dense hairs throughout, those at the extreme base white, the rest black; hind tarsi with whitish hairs.

Hab. Oahu, on *Pipturus*; not rare, and easily bred, but it requires good eyesight to collect a series in the field, as it closely resembles the surface on which it rests, and is as a rule sluggish.



This figure, used on our title page, and on the cover of the earlier numbers, is of *Callithmysus koebelei*, an autochthonous species of beetle hitherto undescribed. On request, Dr. Perkins has kindly supplied the description of this species. (EDS.)

ANNOUNCEMENTS

Meetings are held the first Thursday of each month at 7:30 P. M., notice of the place of assembly being sent to each member by postcard one week previous.

* * * * *

Members exhibiting specimens at meetings of the Society are requested to hand to the Secretary, *at the meeting*, a note in writing of the generic and specific names of all specimens exhibited together with localities, and any remarks thereon which the exhibitors wish published. In the absence of such notes in writing, the Secretary and Editors will not be responsible for the accuracy of the report of such exhibition or for entire omission of any reference thereto in the Proceedings.

* * * * *

The Society, having no separate Library, does not exchange its publications.

* * * * *

The annual dues are five dollars ($5.00) payable on the first day of January in every year. There is no admission fee.

* * * * *

All correspondence to be addressed to the Secretary-Treasurer at the Bureau of Agriculture and Forestry, from whom copies of the Proceedings may be purchased.

* * * * *

Proceedings No. 1, pt. 1, 38 pages, 2 Plates..... 50c.
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A Catalogue of the Hemiptera-Heteroptera of the World, by G. W. Kirkaldy, to be published in 5 volumes, totalling about 2000 pages at a price of about twenty dollars ($20) the whole work. Each volume sold separately. The first volume is now in the press. F. L. Dames, Humboldstr., Steglitz bei Berlin, Germany.

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