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-

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* 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,

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(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 autennae 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

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(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 spurculus* 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.

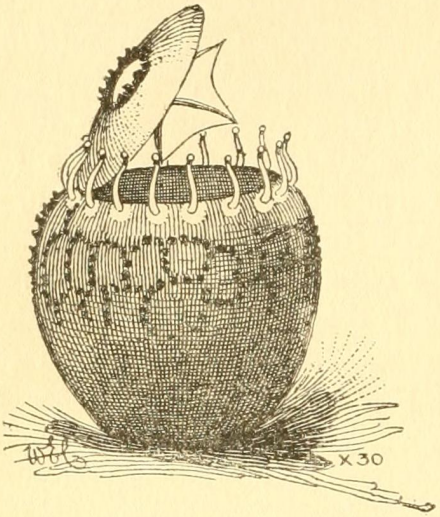
(14) Dodd, see No. 11.

(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 labuim 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.)

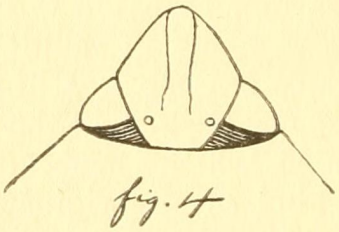


fig. 4

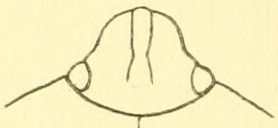


fig. 3

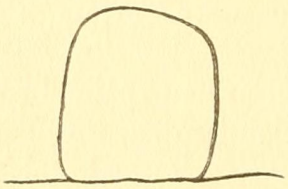


fig 2

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,

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(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 hand, 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; *Anasa* 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.

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(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 microples 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

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(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 pescous, 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

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(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 ([81]).

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 *Latana 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 year 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 $2\frac{1}{2}$ 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).

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(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.

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(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 subsequal. 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.