

REPORT OF WORK  
OF THE  
**EXPERIMENT STATION**  
OF THE  
HAWAIIAN SUGAR PLANTERS' ASSOCIATION

# Leaf-Hoppers and their Natural Enemies

(*PT. X. DRYINIDAE, PIPUNCULIDAE*)

*Supplementary*

By R. C. L. PERKINS

HONOLULU, H. T.  
MARCH 1, 1906

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## LETTER OF TRANSMITTAL.

Honolulu, T. H., January 17th, 1906.

To the Committee on Experiment Station, H. S. P. A., Honolulu, T. H.

Gentlemen:—I herewith submit for publication the tenth part of the Bulletin on "Leaf-Hoppers and Their Natural Enemies," which is chiefly supplementary to the first part, and deals with observations made and material collected by Mr. Koebele in Australia and Fiji. This material was not available until the first part of the Bulletin had already been completed.

Yours obediently,

R. C. L. PERKINS,  
Director, Division of Entomology.



## INTRODUCTORY REMARKS.

In Part I of this bulletin I detailed the habits of some Dryinidae, and described a large number of species, obtained partly as the results of Mr. Koebele's investigations in N. America, and more especially, through our researches in Queensland, from June to December, 1904. I now have to record the additional material that Mr. Koebele secured after my return to Honolulu, when he was continuing his researches for a few months in New South Wales and Fiji. In my introductory remarks on the Dryinidae I was only able to merely mention a recent paper by Dr. J. J. Kieffer on these insects, but as this paper throws light on some obscure points, and corrects several errors of older observers, I shall allude to these matters below, as well as making corrections of some clerical errors in my former paper. I also add a full description of that very distinct parasitic fly *Pipunculus cutrichodes*. In Part IV of this bulletin this species was omitted in the list of species on p. 131, and no detailed description was given subsequently, but both sexes were merely briefly characterized in the "Synopsis of Species" on p. 133 and 135.

As the first part of this bulletin dealing with the chief part of our material, was altogether without figures, I have now made drawings of many of the important structures therein described.

## GENERAL REMARKS.

The number of new species of Dryinidae obtained in New South Wales and Fiji was not large, four from the former State, and the same number from the islands; in addition to which I describe two new species from Queensland. It should be mentioned that of the species already described from Bundaberg, Queensland, which is well outside the tropics, several were afterwards found by Mr. Koebele at Sydney, such species as *Paradryinus koebelei* and *Neodryinus raptor* being common there. At Sydney both of these frequently attack Fulgorids of much smaller size than those which are found infested at Bundaberg. Consequently the Sydney specimens are of very small size as compared with the Queensland examples, but do not otherwise noticeably differ.

I have referred to the facts that a *Gonatopus* is said to have been bred from the beetle *Ptinus fur*, a statement so remarkable, as to need verification. Dr. Kieffer in the paper I have cited tells us that this so-called *Gonatopus* probably belongs to the genus *Cephalonomia* of the Bethyilidae. He also states that the genus *Mystrophorus* has chelate tarsi in the female, Foerster having mistaken his specimens for this sex, when really they were males. In my synopsis of genera in Pt. 1, p. 33 of this Bulletin *Mystrophorus* will therefore have to be removed from the neighborhood of *Anteon*, which will remain as the sole representative of that section of Dryinidae, of which the species have simple front legs in both sexes.

I have still left undescribed the greater number of male Dryinidae obtained by us. It might be supposed that as nearly all our male specimens were bred, there would be no difficulty in determining the species to which these belong. This, however, is by no means the case, for most of the graminivorous Delphacids and Jassids, from which these parasites are obtained, are liable to be attacked by two or three different species, and as males and females of the parasites are not reared from a single individual hopper, but only one or other sex, the difficulty of pairing the sexes is hardly lessened by the fact that the specimens are bred. The matter is really quite complicated, for a Dryinid sometimes attacks many species of leaf-hoppers, and a given leaf-hopper may be attacked by a number of distinct species of these parasites, even when all are collected in the self-same locality. Occasionally even an individual hopper is attacked by two, or even three, species of Dryinid parasites, these usually belonging to at least two genera. It is quite common also to obtain Styloid and Dryinid parasites from a single specimen of the host, and *Pipuncululus* is sometimes associated with one or other of these, but usually with the latter.

Nearly all these difficult males belong to what was once called the genus *Labco*. Ashmead shrewdly conjectured that *Labco* was the male of *Gonatopus*, (*sensu lat.*) a conjecture partially correct. In *Labco*, however, he included male *Dryinus*, as well as *Gonatopus*, although the latter are at once distinguished by their short maxillary palpi, etc., etc. As colonies of *Gonatopus* and its allies can easily be raised in confinement, there is no doubt but that the sexes will ultimately be correctly associated and the generic characters of the males properly established. In my opinion the structure of the palpi, the condition of the parapsides of the mesonotum, and the antennal joints, will be of most use for this purpose. Such, however, is rather the work of a



resident entomologist than of those on a temporary mission, and I do not feel disposed to create a number of new species on males of so-called *Labco*, when many of these would ultimately fall as synonymous with species that I have already described from the other sex.

Additional material received from Koebele has shown no exception to the general rule that a species of Dryinid does not attack Fulgorid and Jassid indiscriminately. *Labco typhlocybae* remains a most peculiar exception\*, especially as the female (described originally as *Dryinus ormenidis*) of this species, of which I received some two thousand cocoons, is apparently attached only to certain species of one special group of the Fulgoridae. In my former paper I have remarked that the comparatively primitive forms of Dryinidae, having the stigma large and ovate, attack Jassids only. I have now met with a single exception to this rule. At Sydney on January 23rd, 1905, Koebele found an adult male of the Fulgorid, *Gactulia chrysopoides*, a species frequently attacked in its nymphal condition by species of *Neodryinus* and *Paradryinus*, bearing beneath the body at the insertion of the hind coxae, the black sac of a Dryinid. The sculpture of the sac itself and likewise its position is so similar to that of *Neochelogyne* that I can hardly doubt that it belongs to this or some allied genus. Unfortunately the mature parasite was not bred.

I may say that the new species here described from Fiji and New South Wales, the fauna in each case being largely distinct from that of Queensland, fall admirably into the genera previously characterized by me. I have some doubts as to the value of my genus *Neodryinus*, as, having obtained Latreille's description of *Dryinus*, I find that this gives 3 joints to the labial palpi like the former, and four teeth to the mandibles. *Dryinus*, however, as interpreted by various hymenopterists, is, in my opinion, a composite genus, and I can not include such forms as *Dryinus americanus* Ashm. and the European *D. tarraconensis* Marshall, which have distinct and parallel parapsidal furrows, in the same genus as *D. ormenidis*, Ashm. and my several species of *Neodryinus*, which are without such furrows, because I attach the highest importance to the condition of the parapsides in the classification of the Dryinidae.

As most of the figures that I have drawn refer to Pt. 1 of this Bulletin rather than to the present, and necessarily no reference

\* I have now reason to believe that this is not a true exception, on which matter see my remarks under *Dryinus* below.

to figures was given in that part, I have given the description of the plates at considerable length, when necessary.

## SYSTEMATIC.

### LIST OF GENERA AND SPECIES HERE DESCRIBED OR DISCUSSED.

The species marked with an asterisk have had the mouth-parts dissected out and mounted in balsam or glycerine.

### DRYINIDÆ.

Pseudogonatopus.

\* *P. melanacrius*, sp. nov.

\* *P. kiefferi*, sp. nov.

*P. perkinsi* Ashm.

Haplogonatopus.

\* *H. citiensis*, sp. nov.

*H. brevicornis*, sp. nov.

Gonatopus.

\* *G. koebleri*, sp. nov.

Neogonatopus.

\* *N. citiensis*, sp. nov.

Epigonatopus.

\* *E. fallax*, sp. nov.

Neodryinus.

Dryinus.

*D. ormenidis* Ashm.

Chlorodryinus.

*C. pseudoplancus*, sp. nov.

Neochelogyus.

*N. ignotus*, sp. nov.

Prosanteon.

*P. melanostigmus*, sp. nov.

### PIPUNCULIDÆ.

*Pipunculus cutrichodes*, sp. nov.

### DESCRIPTIONS OF SPECIES.

#### *Pseudogonatopus.*

On page 35 of Pt. I, in the Synopsis of Species of this genus, the names *P. junctorum* and *P. saccharorum* should be transposed.

*Pseudogonatopus perkinsi*, Ashm.

*Gonatopus perkinsi*, Ashmead, Faun. Haw. Vol. I, pt. III, p. 293.

Hab: Molokai, Maui, Hawaii, widely distributed, but not abundant. I have found the larval sac on Delphacids on *Pipturus* on the Island of Hawaii. There is little doubt that *Labco hawaiiensis* Ashm. is the male, as I have taken this *Pseudogonatopus* in the same spot as the other.

*Pseudogonatopus melanacrius*, sp. nov.

Black, the face, the legs and the basal three antennal joints, pale, yellow or yellowish; the front femora more or less dark, the intermediate and posterior ones sometimes to a less degree darkened, the antennal joints, excepting the first three, black or at least dark, the apical joint not pale. Thorax generally entirely black, except the lateral and posterior margins of the pronotum, which are yellow or ferruginous. In one example the posterior lobe of the pronotum and the middle of the propodeum are more or less of a dark brown or pitchy colour. Head above dark brown or castaneous.

Antennae slender, the third joint long, twice as long as the fourth; top of the head shining and smooth, and moderately deeply concave. Pronotum with deep transverse furrow or constriction, the surface smooth and shining. Mesonotum very narrow, the propodeum long, the lateral anterior angles effaced, finely transversely rugose in front and posteriorly, and between these areas smooth and shining. The thorax is without clothing of erect hairs. The abdomen is smooth and shining and more or less yellow or brown just behind the petiole. Length 3 mm.

Hab: Suva, Fiji; bred from Delphacid on the grass *Zoysia pungens*.

*Pseudogonatopus kiefferi*, sp. nov.

Head above, and abdomen black; the thorax and legs ferruginous, the latter partly dark or black, especially the coxae, the middle and hind tibiae at the apex, and the tarsi on their apical joints. Lower part of face pale; antennae with the second, third and fourth joints, and the base of the fifth more obscurely, ferruginous, the apical joint yellowish, the scape yellowish or white, dark above.

Head very dull, with dense fine puncturation, the third antennal joint very long, nearly twice as long as the fourth, and three times as long as the second. Pronotum shining, with some sparse indefinite punctures; the propodeum dull, and coarsely rugose over its whole surface, the anterior lateral angles distinct, not so rounded off as to be effaced. The propodeal rugosity is transverse in front, then becomes more irregular and somewhat longitudinal, while posteriorly it is again regularly transverse. There is no erect pilosity, and the legs have only a very short and inconspicuous pubescence. The abdomen is smooth, shining and glabrous. Length 4.5 mm.

This large and beautiful species is distinguished from any other described by me by the very strong sculpture of the propodeum.

Hab: Suva, Fiji; bred from a cocoon collected by Koebele on a tree, on which many examples of a Fulgorid, *Vanna viticensis*, were noticed.

*Haplogonatopus.*

In Pt. 1, page 39, line 10 from the top, for 'preceding' should be read 'following.' The mouth-parts of *Haplogonatopus* are similar to those of *Paragonatopus*, not *Pseudogonatopus*. The above correction was overlooked, when a rearrangement of the genera was made before publication.

*Haplogonatopus viticensis*, sp. nov.

Black, but in parts, especially the thorax, dark brown, the legs obscure yellowish brown; two basal joints of the antennae and the third more or less at its base, yellow, the face and mandibles also yellowish, the teeth of the latter dark.

Head very deeply concave, black above, and with a very dense minute puncturation or sculpture rendering the surface dull. Antennae with the third joint less than twice as long as the fourth, the apical one only obscurely pallid at the tip. Pronotum dark brown, smooth and shining, the transverse furrow very obsolete; the mesonotum dull, rather paler than the pronotum, the propodeum bare, transversely rugose in front and posteriorly, and between these parts smooth and shining on the dorsum, the anterior lateral angles effaced. Abdomen black smooth and shining. Length  $2\frac{1}{2}$  mm.

Hab: Suva, Fiji; one female from a Delphiacid on *Zoysia pungens* (Koebele 2377). Bred with *Pseudogonatopus melanacrius*, which it considerably resembles superficially.

*Haplogonatopus brevicornis*, sp. nov.

Head and thorax dark brown or castaneous, the mesothorax and posterior part of propodeum paler, more yellowish brown; the face, two basal antennal joints, the third more or less, and the apical one, yellow or brownish yellow. Legs brownish fuscous, yellower in parts, the tarsi except the apical joints paler yellow. Abdomen black.

Head deeply concave, smooth and shining, the antennae short, the third joint about twice as long as the second, the seventh hardly longer than wide. Thorax smooth and shining, glabrous, and without evident sculpture, the propodeum strongly convexly raised, and very smooth on its anterior portion in front of the spiracles, posteriorly without transverse rugulosity, at most with very feeble indefinite sculpture. Legs without noticeable hairs. Length 2 mm.

This species is obviously distinct from *H. apicalis* by the smooth shining propodeum, apart from many other characters. Only a single specimen was bred, and, owing to the manner in which it is carded, I have not dissected the palpi, but it is probably rightly referred to *Haplogonatopus*. The variegated larval sac is like that of *H. apicalis*.

Hab: Tweed River, Queensland side. Koebele 2232.

*Gonatopus koebelci*, sp. nov.

Shining brown, abdomen and apical half of the antennae black, the legs for the most part paler than the thorax, the basal dilatation of the hind femora and their extreme tips noticeably darker than the part between.

Head above deeply concave, smooth and shining; second joint of antennae slender and quite elongate, the third longest of all and very greatly longer than the fourth. Thorax ferruginous brown, nearly unicolorous, or the mesonotum a little paler; mesonotum and propodeum with fine and long hairs, the latter finely transversely rugose posteriorly, elsewhere smooth and shining like the pronotum. Legs clothed with fine, longish hairs. Abdomen shining black, or slightly brownish-tinged, very sparsely pilose. Length 3 mm.

This is a true *Gonatopus* with 5-jointed maxillary palpi, three distinct joints beyond the geniculation.

Hab. Paramatta, Sydney, N. S. W.; bred from a Jassid (Koebele 2369).

*Neogonatopus vitimensis*, sp. nov.

Black, the lower part of face, the mandibles, except the reddish teeth, and the three basal antennal joints, yellow, the scape darker above. Front legs with the trochanters entirely pale or marked with fuscous, the femora black or dark brown and pale at the tips, tibiae dark above, the tarsi pale, yellow or brownish yellow. Middle and hind legs prettily variegated with dark and yellow, the trochanters, tip of femora and middle of tibiae being pale, the tarsi brownish, blacker towards the apex.

Head very little concave above, the surface not much shining, the microscopic sculpture excessively fine. Whole thorax sparingly clothed with short erect grey hairs; the pronotum more or less shining, the rest of the thorax duller, and densely minutely punctate or shagreened; the propodeum elongate and not at all abruptly raised in the spiracular region. Front trochanters unusually short and robust, not with the usual long stalk. Abdomen smooth and shining and very sparsely pilose. Length 3-3.5 mm.

This interesting species in the structure of the trochanters and the shape of the head approaches the genus *Pachygonatopus*.

Hab: Suva, Fiji; bred from a small Jassid on grass (Koebele 2378).

*Epigonatopus fallax*, sp. nov.

Black, the clypeus more or less yellowish, the mandibles white with red teeth, three basal antennal joints yellow; the abdomen behind the petiole slightly brownish or pitchy. Legs with the apices of the coxae, the trochanters for the most part, the apical thin part of the femora, except the tips of the hind ones, yellow; front tibiae and tarsi testaceous, middle and hind tibiae dark at base and tips and paler between, the tarsi fuscous. The superficial appearance of this species owing to its black colour and variegated legs is very like that of *Neogonatopus vitimensis*.

Head deeply concave, and the surface shining, the third antennal joint long and very slender, one and a half times as long as the fourth. Pronotum smooth and shining, the rest of the

thorax duller, propodeum elongate and not very high, very finely transversely rugulose at the sides and posteriorly, and without clothing of erect hairs. Legs not noticeably hairy. Length 3 mm.

This species differs greatly in superficial appearance from *E. solitarius*, which has a ferruginous thorax, but structurally it is rather closely allied.

Hab: Mittagong, N. S. W.: collected in grass, January 18th, 1905, by Koebele.

*Ncodryinus*.

This name in the list of species, on page 29 of Pt. 1, three lines from the bottom, is by error printed as *Ncogonatopus*.

*Dryinus* Latr.

The generic characters of female *Dryinus*, as given by different authors, disagree so in such essential points, that without specimens or an adequate description of the type species, I cannot fix these characters. Latreille in his characterization of the genus in 1809 clearly confounded characters peculiar to *Gonatopus* with those of *Dryinus*. His original description in 1805 is not accessible to me. Marshall in his paper describing *D. tarraconensis* gives no characters of use to me, but the figure of this insect is useful for generic purposes. Haliday shows well the distinction between the mouth-parts of *Dryinus* and *Gonatopus*. I herewith give some of the diverse characterizations of *Dryinus* as given by different authors.

Latreille, 1809.

Mandibles 4-dentate.  
Maxillary palpi 5-jointed.  
Labial 3-jointed or with 2  
distinct.  
Parapsides ?

Marshall, 1868.

Characters of mouth-parts  
entirely omitted.  
Parapsidal furrows distinct in  
figure and parallel.

Haliday, 1833.

Maxillary palpi 6-jointed.  
Other characters not men-  
tioned.

Ashmead, 1893.

Mandibles 3-dentate.  
Maxillary palpi 6-jointed.  
Labial palpi 2-jointed.  
Parallel parapsidal furrows  
figured on plate.

True Characters of *Dryinus ormenidis* Ashmead.

Mandibles 4-dentate.  
 Maxillary palpi 6-jointed.  
 Labial palpi 3-jointed.  
 No distinct parapsidal furrows.

*Dryinus ormenidis* Ashm.

*Dryinus ormenidis* Ashmead, (female); Ent. News, XIV, p. 192.

*Labco typhlocybae* Ashmead, (male); loc. cit.; not *Labco typhlocybae* Ashm. Mon. Proct. N. A. p. 89.

Swezey bred a number of males and females, determined as above by Ashmead, from cocoons obtained from the Fulgorid, *Ormenis pruinosa*. He rightly concluded that they were sexes of one species, as was subsequently confirmed by breeding hundreds of both sexes from cocoons sent from N. America by Koebele. Copulation was observed on many occasions. The males retained by Swezey do not in any way agree in the structure of the antennae with Ashmead's description of these parts in the original example of *Labco typhlocybae*, bred by Riley from a *Typhlocyba* on *Celtis*. If that description is correct, it is not only utterly impossible that the type of *L. typhlocybae* can belong to the same species as the male of *Dryinus ormenidis*, but further, it cannot be placed in the same genus in my opinion.

Ashmead's description of type  
 of *Labco typhlocybae*.

"Antennae 10-jointed";  
 "the pedicel is more than  
 twice as long as the scape;  
 the first flagellar joint is two-  
 thirds the length of pedicel;  
 the fourth and fifth equal and  
 a little longer than the first."

Description of three males in  
 Swezey's collection.

The scape is stout and as  
 long or longer than the pedi-  
 cel, not shorter; the first flag-  
 ellar joint is very long, about  
 equal to the scape and pedicel  
 together, and distinctly long-  
 er than the following joints  
 of the flagellum.

*Chlorodryinus pseudophanes*, sp. nov.

Black, the antennae, the margins of the pronotum (more wide-  
 ly at the sides posteriorly) and for the most part the front legs,



the tarsi, and the apical compressed abdominal segment, ferruginous. Scape of antennae in front and the clypeus marked with yellow, the mandibles yellow with red teeth. Wings with a transverse smoky band through the basal cells and a large ante-

Head in front dull and very densely punctured. Pronotum pubescent, shining, somewhat rugosely punctured; mesonotum quite dull, except the smooth anterior constriction, very densely sculptured, being finely granulate or shagreened; scutellum somewhat shining and punctured; propodeum with fine and close rugose reticulation. Abdomen smooth and shining. Length 4 mm.

Agrees well generically with *Chlorodryinus pallidus* in the incompletely margined head, the simple pronotum, the incomplete parapsidal furrows, etc., and only its superficial appearance is that of a *Paradryinus*.

Hab: Brisbane, Queensland; a single female was captured by Koebele on low bushes.

*Neochelogyus ignotus*, sp. nov.

Black, scape of antennae and front legs yellow or ferruginous, second and third joints of antennae obscurely reddish, the rest black. Middle and hind femora and tibiae more or less brown or dark-coloured, the tarsi except the apical joint pale yellow; the mandibles pale.

Head large, densely rugose or rugosely punctate, but the sculpture is not coarse, and is still finer on the front, which is clothed with silvery hairs. Pronotum rugose; mesonotum shining and sparsely punctate; the scutellum and post-scutellum smooth and shining; propodeum finely irregularly rugose, the posterior median area well defined, somewhat smoother, dull and rugulose. Wings with the stigma and radius fuscous, the rest of the neuration pale. Abdomen black, shining and impunctate. Length 3 mm.

This species in the sculpture of the head (which is much finer than in most of the allied species) agrees with *N. nigricornis*, the black antennae of the latter serving at once to distinguish it.

Hab: Sydney, N. S. W.; collected Feb. 2nd, 1905, by Koebele.

*Prosantcon uclauostigmus*, sp. nov.

Black, the mandibles and scape of the antennae ferruginous, the front tibiae and front and middle tarsi pale ferruginous or

yellowish, anterior femora and the intermediate and posterior femora and tibiae mostly dark, black or pitchy, hind tarsi dark above. Wings hyaline, stigma dark fuscous.

Head rugose from the coarse shallow puncturation, as also is the pronotum; mesonotum smooth and shining, with a few fine punctures; propodeum finely irregularly rugose, its posterior median are a well defined, smoother, and in certain aspects slightly shining. Length 3 mm.

Distinguished at once from *P. chelogyoides* by the dark stigma and the colour of the legs.

Hab: Mittagong, N. S. W.; collected on *Melaleuca*, January 18th, 1905, by Koebele.

## PIPUNCULIDAE.

### *Pipunculus cutrichodes*, sp. nov.

Head black, with the front and face covered with glistening white tomentum, posteriorly with greyish white at the sides, and fuscous in the middle. In the female the head between the eyes in front of the ocelli is shining black. Antennae black, third joint yellow (sometimes somewhat clouded) and distinctly acuminate produced at the apex. Thorax pilose, and clothed with fuscous tomentum, at the sides in front and on the pleura whitish; scutellum with long, fine, erect hairs; metanotum with dense whitish tomentum. Halteres yellow, dark at base. Legs black or piceous, tip of femora, tibiae, and tarsi yellow; the tibiae more or less infuscate or blackish, as also the apical tarsal joint. Abdomen black, shining, clothed with outstanding conspicuous longish pubescence, the first segment with a whitish tomentose band; the second in the female generally noticeably whitish, as also all the other segments at the sides in both sexes; the basal segment is without any row of black bristles at the sides; hypopygium less clothed than the other segments in the male (but similarly in the female) and more or less impressed at the base, with a smooth lateral lobe on the right side. Ovipositor straight and rather short. Wings distinctly smoky, stigma obscure brown, about as long as the fourth costal segment; venation black or dark brown, more or less pale at the base. Length 3-3½ mm.

Hab: Cairns district, Queensland. Not common.

## DESCRIPTION OF PLATES.

## Plate XXXIII.

1. *Eukoebelia mirabilis*, female.
2. *Bruchomorpha* sp?, containing the ruptured larval sac of *Eukoebelia*. Several sacs are often found on a single hopper, and both nymphs and adults (long- and short-winged alike) are affected.
3. *Phrynophryes* sp.; the left tegmen and rudimentary wing are displaced and show the empty sac, from which *Chalcogonatopus decoratus* was bred.
4. Nymph of *Tartessus*? in a much collapsed state, from the sac on which was bred a female *Prosantcon chlogynoides*.

## Plate XXXIV.

1. *Eurinoscopus* sp., nymph in ventral aspect, showing the empty larval sac of a *Ncochlogynus destructor*, inserted in the usual position behind the posterior coxae.
2. *Eulcimoniis* sp. with empty larval sac of *Ncochlogynus coriaceus* inserted in the neck.
3. *Athysanus curtisii*, with empty sac of *Neogonatopus brunescens* placed on the abdomen. The left tegmen is somewhat displaced by the parasite.
4. *Liburnia* sp. nymph, shrunken and distorted, bearing two empty sacs of *Haplogonatopus americanus*.
5. *Colgar peracutus*, nymph much shrunken, with empty sac of *Paradryinus koebelei* beneath the left tegmen.
6. *Perkinsiella saccharicida*, nymph much collapsed and distorted, bearing two empty sacs of *Pseudogonatopus dichromus*. This hopper is an Hawaiian example, that was infected by a parasite imported from Australia, where it attacked small graminicolous *Liburnia*.
7. *Stenocranus dorsalis*, nymph with empty sac of *Pseudogonatopus stenocrani*, attached between the bases of the tegminal pads.
8. *Privesa aphorophoroides*? nymph much shrunken, and with the long fan-like caudal filaments removed, bearing two sacs of *Paradryinus tenator*, one beneath the tegminal, the other beneath the alar pad. In life the beautiful fan-like filaments are turned back over the body, the parasitic sacs are only seen when the tail is depressed.

9. *Deltocephalus* sp., nymph shrunken and distorted, bearing an empty larval sac of *Neogonatopus dubiosus*.

## Plate XXXV.

1. *Idiocerus*, nymph with the abdomen much shrunken, and bearing an empty sac of *Neochelogyms cognatus*.
2. *Perkinsiella saccharicida*, nymph with sac of *Echthrodelphax fairchildii* under the left tegmen.
3. *Ipo conferta* nymph, much shrunken and collapsed, bearing six empty saes of *Parantcon myrmecophilus*. One of the saes is not visible in the dorsal aspect of the hopper.
4. *Neodryinus raptor*, cocoon, subdiagrammatic. The two larval skins which are pierced by 8 distinct spiracles on each side, and form nearly the whole of the sac, are spread out as a roof over the middle part of the cocoon. This middle part contains the pupa, the large outer part of the cocoon serving for attachment to the leaf surface.
5. *Neodryinus koebelci* cocoon. The inner of the two skins is not pierced by evident spiracles, while those on the outer skin are but seven in number on each side, the three stigmata, at one end of each series, being much larger than the others. For the rest the cocoon is like that of *N. raptor*.
6. *Paradryinus threnodes*, empty cocoon, the insect having escaped by cutting out a cap, as seen at one end. The cocoon is densely studded with rounded portions, gnawed from the leaf-surface.
7. *Paradryinus koebelci*, empty cocoon; the patches of leaf-substance are less thickly strewn, and are of more elongate form.
8. *Neochelogyms destructor*; the subterranean cocoon is covered with particles of sand, so that the silken basis cannot be seen; the insect has emerged from the hole at one end of the cocoon, the cap having been entirely detached.
9. *Prosantcon chelogyoides*, female; chelae and adjoining tarsal joints.
10. *Thaumtodryinus koebelci*; chelae and the three preceding tarsal joints. The two teeth before the apex of the chelar claw, and the single lamellate spine near the tip, as well as the two kinds (long and short) of lamellae, placed alternately, on the fifth tarsal joint, are very remarkable in this genus, and were not noticed in my original description.

## PLATE XXXVI.

1. *Paradryinus*; six-jointed maxillary and three-jointed labial palpi.
2. *Neodryinus koebelci*; six-jointed maxillary and three-jointed labial palpi.
3. *Prosantcon chelogyoides*; showing similar parts.
4. *Chalcogonatopus gigas*, showing the same.
5. *Neochelogyus nigricornis*; maxillary palpus with 6-joints.
6. *Eukoebelcia mirabilis*; maxillary palpus with six, labial with three joints.
7. *Parantcon myrmecophilus*, showing the same.
8. *Gonatopus australiae*; five-jointed maxillary palpus.
9. *Pseudogonatopus americanus*; four-jointed maxillary palpus.
10. *Neogonatopus dubiosus*; four-jointed maxillary palpus.
11. *Haplogonatopus americanus*; two-jointed maxillary, and two aspects of the two-jointed labial palpus.
12. *Epigonatopus solitarius*; two-jointed maxillary palpus.
13. *Echthrodelpfax fairchildii*; four-jointed maxillary palpus.
14. *Paragonatopus nigricans*; two-jointed maxillary palpus.
15. *Pachygonatopus melanias*; three-jointed maxillary palpus.

All the above figures are drawn with *camera lucida* from dissections mounted in balsam or glycerine; the very short basal joint of the maxillary palpus in some cases is not very distinct. The labial palpus of all the forms of which the maxillary palpi are represented by fig. 8-15, is very short and two-jointed, and is drawn only in the case of *Haplogonatopus* (fig. 11).

## Plate XXXVII.

1. *Gonatopus australiae*, chelae.
2. *Pseudogonatopus dichromus*, chelae and preceding tarsal joints.
3. *Epigonatopus solitarius*, chelae.
4. *Paragonatopus nigricans*, chelae.
5. *Chalcogonatopus gigas*, chelae.
6. *Haplogonatopus americanus*, chelae.
7. *Pachygonatopus melanias*, chelae.
8. *Echthrodelpfax nigricollis*, chelae.
9. *Neogonatopus viticensis*, chelae and preceding tarsal joints.

It will be observed that fig. 1, 3, 5, 7, 9, show the similarity between the chelae of the forms of *Gonatopus*, *sensu*

*lat.*, which preys on Jassids, while fig. 2, 4, 6, 8, show these parts in parasites of *Gonatopus*-like appearance, which prey on Fulgoroids, and which are also very similar to one another, but markedly distinct from those above mentioned. The new genera into which I have divided the old *Gonatopus* are easily determined by examination of these chelae, together with the mouth-parts figured on Pl. XXXVI, fig. 8-15.

10. *Paradryinus koebelci*, chelae and preceding tarsal joints.
11. *Neochelogyne*, chelae and two preceding tarsal joints.
12. *Neodryinus koebelci*, chelae, and three preceding tarsal joints.
13. *Paranteon myrmecophilus*, chelae and three preceding tarsal joints.
14. *Eukoebelia mirabilis*, chelae. The single lamellate spine at the tip of the process of the fifth tarsal joint may be compared with that in the same position on the chelae of *Thaumatomyia*.
15. *Paradryinus koebelci*; pronotum in profile, showing its very irregular outline.
16. *Chlorodryinus pallidus*; pronotum with almost regularly convex outline.
17. *Paradryinus*; mesonotum showing the parapsidal furrows.
18. *Chlorodryinus*; mesonotum showing the same.
19. *Echthrodelpax*; mesonotum showing the same.
20. *Neochelogyne*; mesonotum showing the same.

All the figures are drawn from female examples.

### PLATE XXXVIII.

1. *Paradryinus koebelci*, showing the mode of disposition of the long front legs, when at rest. The body is supported on a part of the dorsum of the abdomen, which alone touches the surface on which the creature rests. In the case of the example figured the center of gravity is far in advance of the point of contact between the abdomen and the resting surface, but equilibrium is maintained by the grip of the claws of the middle and hind feet. The legs of the left side only are figured, those on the right side holding similar positions. In different species there is some variation in the positions assumed at rest, but the following genera, *Neodryinus*, *Paradryinus*, *Chlorodryinus*, *Thaumatomyia*, and *Chalcogonatopus*, all rest on the recurved abdomen with the body suberect, or oblique, and

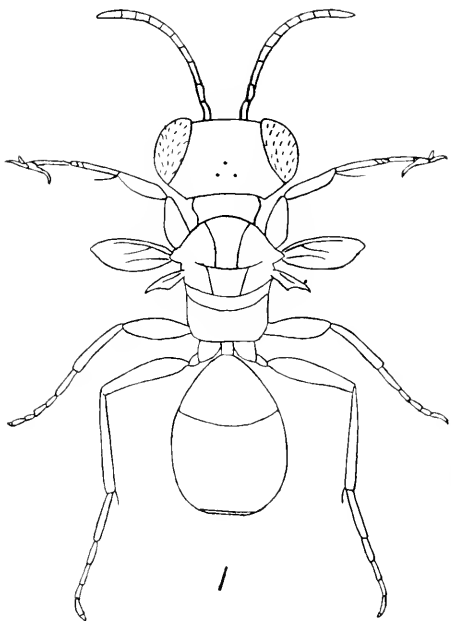
- the front legs free, while the rest of the forms described by me assume a normal horizontal position when resting.
2. Head of *Echthrodelphax nigricollis*, male, showing its incrassate form.
  3. Head of *Paragonatopus nigricans*, male, showing the usual form in this sex of *Gonatopus sensu lat.*
  4. Arrangement of ocelli in *Necodryinus*, male.
  5. Arrangement of ocelli in *Paradryinus*, male.
  6. Ocelli of *Echthrodelphax*, female.
  7. Antenna of female of *Parantcon*.
  8. Antenna of female *Necochelegynus*.
  9. Pedicel and two first funicle joints of female of *Thaumodryinus koebelei*.
  10. Two apical antennal joints of the same, still more highly magnified.
  11. Antenna of male of *Echthrodelphax nigricollis*, showing its extremely slender form, a generic character.
  12. Antenna of male of *Paragonatopus nigricans*, showing the less slender form of those organs in this and most of the genera formerly included in *Gonatopus*. This and the preceding figure are drawn under similar magnification.



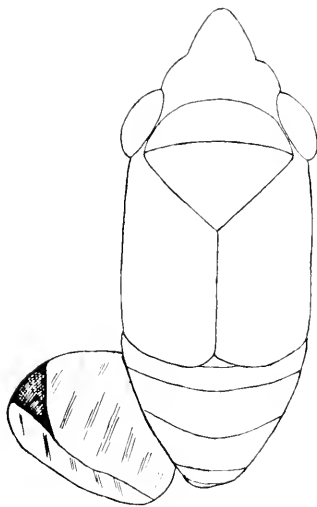




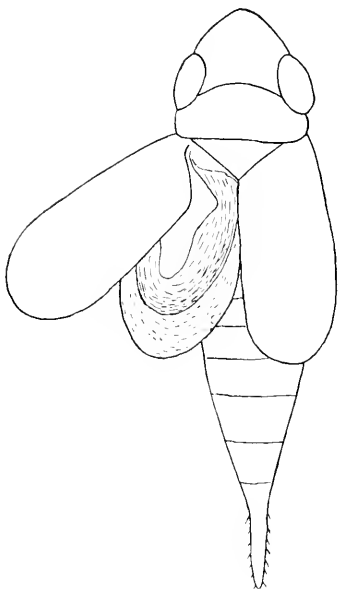




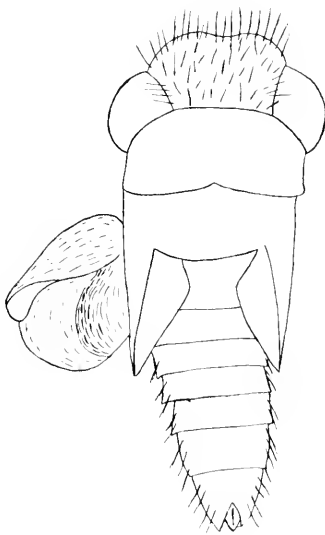
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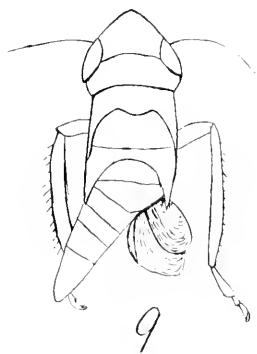
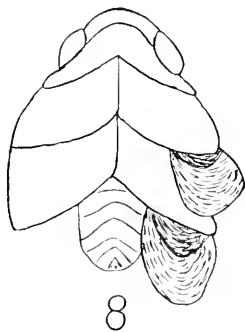
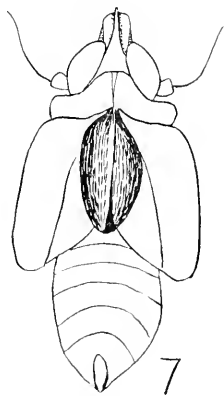
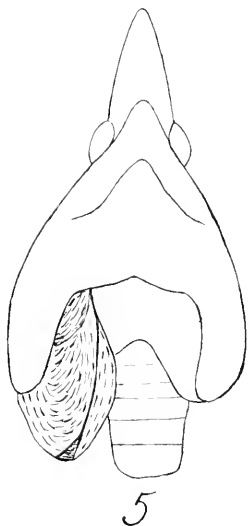
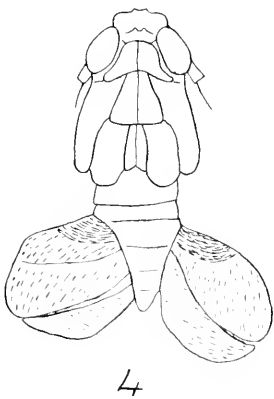
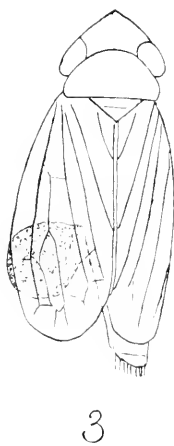
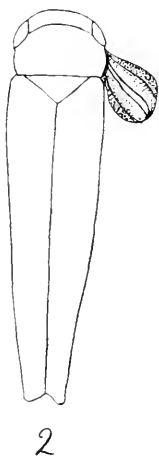
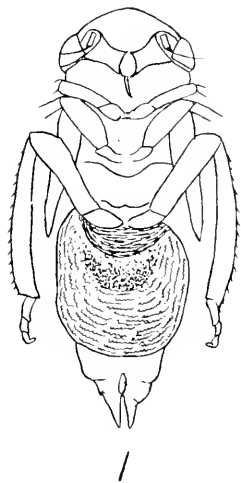


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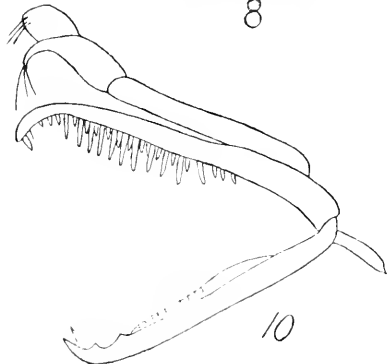
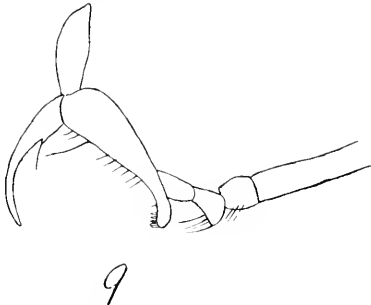
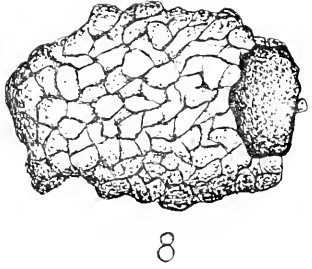
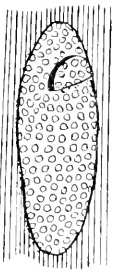
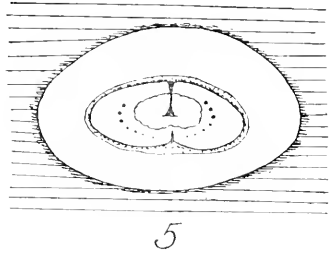
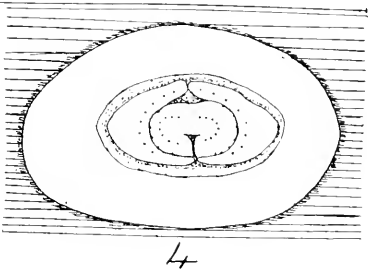
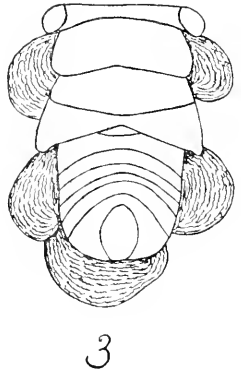
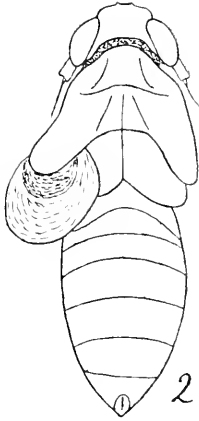
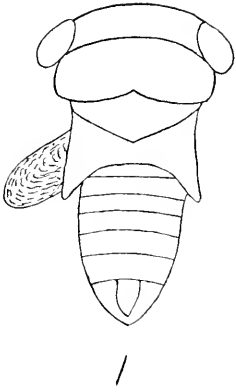
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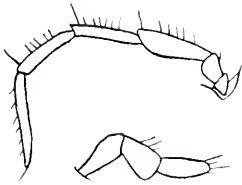




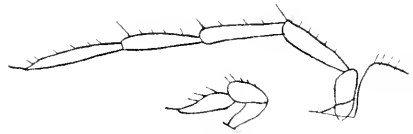
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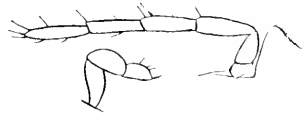
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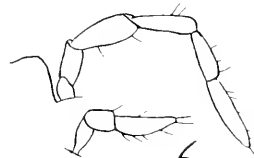
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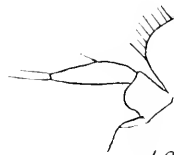
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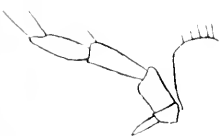
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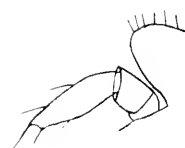
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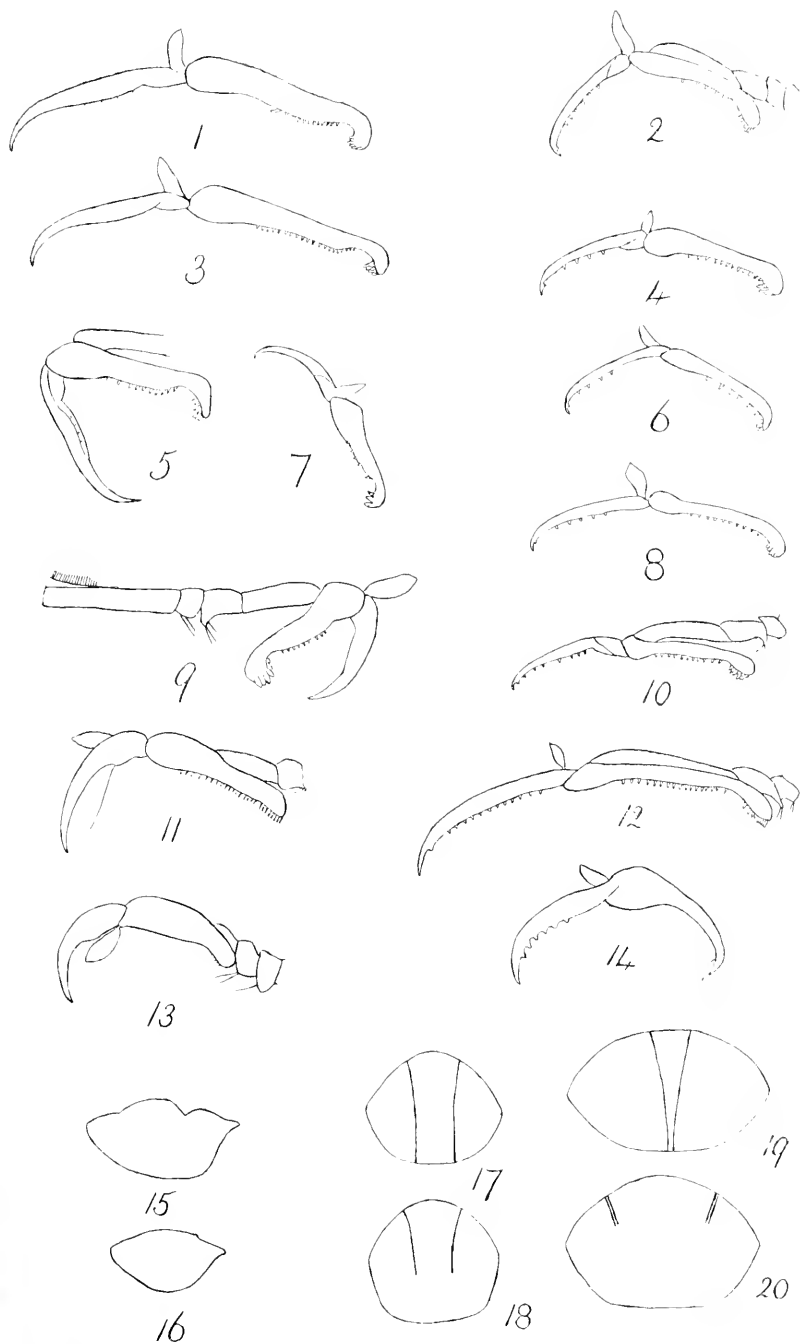


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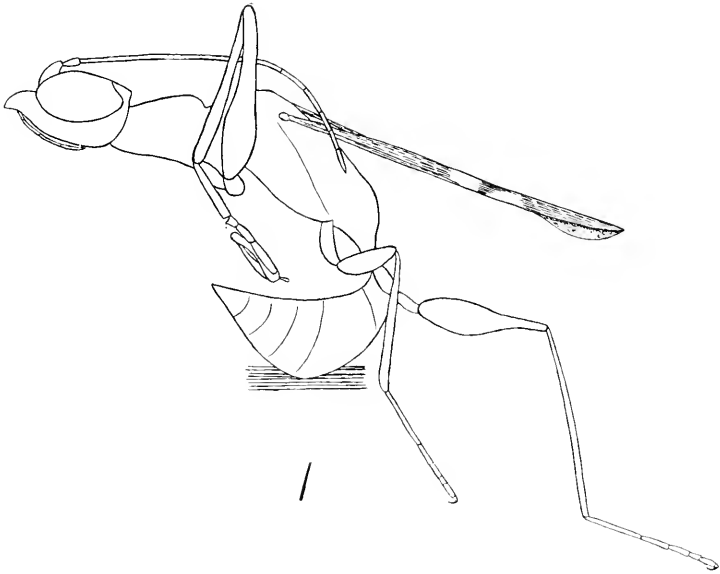
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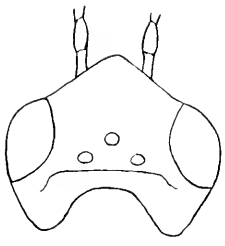


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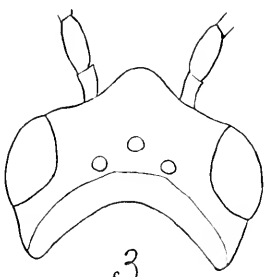




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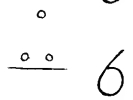
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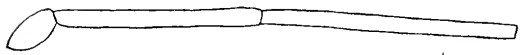
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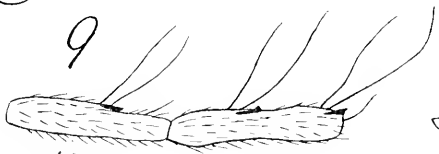
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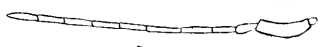
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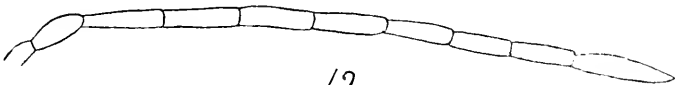
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## ERRATA.

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It is requested that these corrections, when important, be made in the text. It will be observed that, owing to deficiencies of the press, accents on foreign words are entirely omitted.

Page 29, line 25, for "*Xcogonotopus*" read "*Xcodrygius*."

Page 35, line 19, for "*P. junctorum*" read "*P. saccharorum*."

Page 35, line 26, for "*P. saccharorum*" read "*P. junctorum*"

Page 39, line 10, for "preceding" read "following."

Page 69, line 1, for "Girard" read "Giard."

Page 164, line 15th from top, for "Dube" read "Dubr."

Page 166, diagram, for "ecdysis" read "instar."

Page 168, line 4th from top, for "and 2nd joint" read "the 2nd joint."

Page 168, line 6th from bottom, for "even testaceous" read "seven testaceous."

Page 176, line 4th from bottom, for "nercules" read "nervules" for "graduate" read "gradate."

Page 176, line 5th from bottom, for "nercules" read "nervures."

Page 180, line 8th from bottom, between "b" and "e" insert "c, membranous area representing the 8th sternite; d. posterior chitinized emargination of the 8th sternite;"

Page 229, line 3rd from bottom, for figs. "8-19" read "8-10."

Page 231, line 8, for "*lineola*, Fabr.," read "*strigula* (Boisd.)"

Page 232, line 8, for "*Verania* sp." read "*Verania furcifera* (Guerin.)" We are indebted to Rev. T. Blackburn for these identifications.

Page 232, line 26, for figs. "1, 3" read "1-3."

Page 233, line 25, for "fig. 2," read "fig. 3."

Page 234, line 23, for "fig. 3," read "fig. 2."

Page 234, line 32, for Plate "xviii," read "xvii."

Page 236, line 5, for fig. "5," read "6, 6a."

Page 236, line 9, for fig. "6," read "5."

Page 236, line 15, delete, and read "*Oechalia griseus* (Burm.) \*Pl. xvii, figs. 5-7."

Page 248, after line 18, add "*E. exiltiosus* sp. nov. et typ. gen."

Page 250, line 15, for "oblique line" read "oblique bare line."

Page 271, line 20, for "probocis," read "proboscis."

Page 273, line 12, for "abnormal," read "arboreal."

Page 273, line 4th from bottom, for "tho" read "though."





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