DIVISION OF ENTOMOLOGY

BULLETIN NO. 1
PART 8

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

Leaf-Hoppers and their Natural Enemies

(PT. VIII. ENCYRTIDAE, EULOPHIDAE, TRICHOGRAMMIDAE)

BY R. C. L. PERKINS

HONOLULU, H. T.
JANUARY 6, 1906

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LETTER OF TRANSMITTAL.

Honolulu, T. H., December 1, 1905.

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

Gentlemen:—I, herewith, submit for publication the eighth part of the Bulletin on "Leaf-Hoppers and Their Natural Enemies," which deals with the Chalcid flies which are parasitic on the leaf-hoppers themselves, or on some of the insects that destroy them.

Yours obediently,

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

GENERAL REMARKS.

The present paper deals with such members of the great Chalcidoid series as are connected with leaf-hoppers, but excludes the Mymaridae, which have been treated of already in Part VI. of this Bulletin. I had intended to include all the species that were bred by us during our studies of leaf-hoppers in Australia, and further to describe the few species of Ichneumon flies that were connected with certain of the natural enemies of Homoptera, but these and a few of the Chalcids I have decided to leave at present undescribed. Of some of these the material for study is inadequate, and of others the habits were not sufficiently closely examined as to warrant their inclusion in this study. Further, to any one acquainted with the difficulties presented by these most extensive series of insects, and with the fact that most of the species that we obtained, belong to some of the largest and most difficult families in these series, while no semblance of a classified reference collection exists in the Hawaiian Islands, it will not be surprising that I have refrained from dealing with a few of the most obscure and difficult forms. Most of these, however, I shall refer to incidentally in the following remarks:

HABITS OF THE PARASITES HERE CONSIDERED.

We may divide the Chalcid parasites connected with leaf-hoppers into five classes according to their habits.

(1). Direct enemies of leaf-hoppers or primary parasites, i. e., those which attack these in one stage or another, from the egg to the adult.

(2). Species beneficial to leaf-hoppers, or secondary parasites, i. e., those which destroy the direct enemies or primary parasites.

(3). Species which are indirectly enemies of leaf-hoppers, or tertiary parasites, since they destroy the secondary parasites.

(4). Species which are beneficial to leaf-hoppers, since they are parasites of predatory insects that destroy leaf-hoppers.

(5). Species which are indirect enemies of leaf-hopper since they destroy the preceding.

In the first of these divisions if we exclude egg-parasites,

both Mymarid and those of other families, only two primary Chalcid parasites of leaf-hoppers are known to us. These form two new and remarkable genera in the Encyrtidae and both are parasites of Jassids, in fact were bred from the same species, the one, *Meniscocephalus*, being remarkable on account of its sculpture; the other, *Neocladia*, for the fine six-branched antennae of the male and the foliaceous dilated hind legs of the female. The latter was bred from nymphs and mature specimens of the Jassid it attacks, the larva filling up the abdomen of the leaf-hopper, much as does that of a *Pipunculus* fly. The Chalcid larva, however, pupates within its host, not emerging when full fed, as does that of the parasitic fly. The mature insect escapes by rupture of the abdomen where it is attached to the thorax, just as does the larva of *Pipunculus*.

No doubt the egg-parasites of leaf-hoppers will prove to be numerously represented amongst the Encyrtidae, on future investigation. The eggs of *Siphanta* and allied genera, and those of *Platybrachys* and its allies, in fact such eggs as are not imbedded in the tissues of leaf or stem, are very subject to their attacks. Here belong the parasites described under the generic names *Fulgoridicida* and *Ectopiognatha*, and one or two other obscure and very minute species, which I have not yet adequately investigated. Apart from the Encyrtinae another egg-parasite was obtained, the species forming a new genus of the Trichogrammidae. This is a very valuable insect in that it destroys the eggs of a common Jassid, which frequents the Eucalyptus trees in Australia. It will be remembered that it has long been known that the eggs of the buffalo tree-hopper (*Cercsa bubalus*) are destroyed by a parasite of this family.

Throughout Australia and Fiji the eggs of the sugar-cane leaf-hopper are destroyed by the Tetrastichine genus, *Ootetrastichus*, hereafter described. This parasite differs in its habits from the species of *Anagrus* and *Paranagrus* of the Mymaridae, in that a single parasitic larva destroys all the eggs contained in an egg-chamber, instead of each individual being developed at the expense of only a single egg. To escape from the egg-chamber, the adult parasite gnaws a round hole for its exit, much like that made by *Anagrus frequens*, excepting that it is larger. As the number of eggs deposited by the leaf-hopper in the egg-chamber varies much, so the size of the parasites is likewise very variable, some individuals being twice the bulk of others.

On one occasion in company with the *Ootetrastichus* a single

specimen of a form allied to *Oligosita* was bred by Koebele. This might be either an egg parasite of the leaf-hopper, or a secondary parasite, the latter, I suspect, being the case.

Turning to the second division, the hyperparasites or secondary parasites of leaf-hoppers, most important of these are the parasites of the Dryinidae. These comprise six distinct genera, *Echthrodryinus*, *Echthrogonatopus*, *Helegonatopus*, *Chalcedrinys*, *Cheiloneurus* and *Saronotum*. I have already in Part I of this Bulletin stated the importance of these hyperparasites, in limiting the value of the Dryinidae. In the case of the first five genera named above, several individuals (frequently about half a dozen) are bred from a single host, but in the case of *Saronotum*, only a single parasite is bred at the expense of the Dryinid. This hyperparasite emerges from the Dryinid larva soon after its cocoon is formed, then continues to feed on the body for some days. The others, on the other hand, appear to emerge simultaneously, and full fed, as soon as the cocoon of their host is completed. None of these hyperparasites will oviposit in the larva of the Dryinid after the cocoon is formed, but the larva of the latter is stung, while still attached to the leaf-hopper.

The discovery of parasites on Dryinidae was made by Swezey, who obtained *Cheiloneurus swezeyi* from the cocoons of *Dryinus ormenidis* in North America. Subsequently from cocoons of the same species sent here by Koebele at least a thousand examples of this hyperparasite were bred. Ashmead on the ground that theoretically *Cheiloneurus* should be the parasite of some scale-insect, in describing the species remarked that "some mistake has been made" by Swezey, but it is he himself who is mistaken. *Cheiloneurus* is a very common parasite of Dryinidae in Australia as well as in America. *C. swezeyi* is a particularly interesting species from the fact that the female is dimorphic, being either fully winged or wingless. The latter form far outnumbers the winged in the individuals bred by me, and both were represented in Swezey's few specimens. There is no modification of the thorax in the wingless examples, which, but for the absence of these organs, quite resemble the others, though perhaps they may be of slightly smaller size on the average. We did not discover any wingless examples of the Australian species.

The only other secondary parasite of leaf-hoppers that is known to me, is likewise an Encyrtid, but belongs to the Eupelminae, while all the others belong to the Encyrtinae. It was bred from the puparium of the parasitic fly, *Pipunculus cinerascens*, and is described below as a new species of *Anastatus*. Only

a single individual was bred, which emerged on the first of January, 1905, in the neighborhood of the Fiji Islands, when I was returning to Honolulu, the puparium, from which it was bred, having been collected three weeks or a month previously. This parasite escaped by a roundish hole gnawed in the top of the puparium, and did not cause the usual deniscence of the latter, which always takes place along definite lines, when the fly emerges.

Of the third division of parasites or tertiary parasites of leaf-hoppers I have only to cite here a single species. This is a minute species of the Eulophidae, bred from the cocoons of Dryinids, parasitized by *Helegonatopus*. Only one example of this appears to have been preserved, and its condition is such that its exact position cannot be determined without additional specimens. It was bred from material sent to the islands from Ohio by Koebele.

The fourth division contains the parasites of insects that habitually prey on leaf-hoppers. Here we include the parasites of leafhopper-eating ladybirds, of the lace-wing flies (Chrysopinae) and of the hover-flies of the genus *Baccha*, as well as those of the voracious crickets of the genus *Xiphidium*, and with these may be noticed one or two species that possibly belong to the fifth division. To the parasites of the ladybirds no very special attention was paid, and they are not included in the descriptive part of this paper. Throughout Queensland we met with that common and widely spread enemy of ladybirds, the Braconid, *Centistes americana*, attacking species both of *Coccinella* and *Verania*, and what was new and interesting to us, it was also bred from a very different ladybird, the blue *Orcus ovalis*, a species most abnormal in its habits for that genus, since it feeds on fungi growing on cane leaves and grasses. Such habits are known in certain other Coccinellids but totally foreign to those of the other species of *Orcus*, which are all carnivorous. The Braconid parasite, as is well known, attacks the mature ladybird, and I have given some account of its habits in these islands in an earlier bulletin. In Australia, ladybird larvae were further infested with two species of Encyrtidae, allied to *Homalotylus*, but apparently distinct generically from that, and from one another. In the same vials with these, various other parasites emerged, supposed at the time to be secondary parasites, or possibly some of them primary ones, of the ladybirds. Amongst these was a species of the remarkable genus *Euryischia* and a Pteromalid near to and perhaps identical with the genus *Ophelo-*

sia. As the same care was not taken in isolating the parasitized ladybirds, as was given to all our other insects, the true relationship of these parasites and some others must remain doubtful. It is noteworthy that *Euryischia* was originally bred from *Lestophonus*, the dipterous parasite of *Icerya*, and *Ophelosia* as a direct parasite of that scale, while ours were supposedly bred from *Orcus* and *Verania* parasitized by other Chalcids. It would seem probably therefore that in reality some scale-insects (though hardly possibly the conspicuous *Icerya*) were accidentally included with the ladybirds mentioned, and some of these may have been further infested with parasitic Diptera. The original assignment of *Ophelosia* and *Euryischia* was no doubt made after careful study, whereas no special precautions were taken with my parasitized *Orcus* and *Verania*, as I have said.

It may be remarked that here are only mentioned such parasites as were connected with those ladybirds we wished to introduce into the islands, to prey on leaf-hopper. Other ladybirds were noticed to be excessively parasitized by quite other parasites but these are without the scope of this Bulletin.

As parasites of some of the other predaceous insects, we must notice the egg-parasite of the long-horned cricket (*Xiphidium varipenne*). I have separated this generically from the well-known genus *Aphelinus* on account of the antennal disparity in the sexes, the position of the ocelli, and some other differences. It is interesting to note that *Aphelinus locustarum* of Giraud was bred from eggs of *Xiphidium fuscum* in Europe, but whether it is generically the same as ours I do not know, as I have not the original description. Excepting these two cases, all or nearly all the Aphelininae, of which the habits are certainly known, are parasitic on scale insects (Coccidae) plant-lice (Aphididae) or Aleurodidae.

The lace-wing flies (Chrysopinae) are, as is well-known, subject to the attacks of various parasites. We may here refer to two Ichneumons, a Cryptid bred from the cocoons of a remarkable Australian lace-wing, which apparently feeds only on the nymphs of *Siphanta* and its allies; and another ichneumon of the same group, that attacks the Hawaiian *Chrysopa microphya*. In addition to these the stalkless eggs of the endemic Hawaiian genus *Anomalochrysa* are destroyed by a minute Trichogrammid, allied to *Pentarthron*.

PARTHENOGENESIS.

In Part VI of this Bulletin I have remarked on the general occurrence of parthenogenesis in the Mymarid parasites of the genera *Anagrus* and *Paranagrus*, which attack leaf-hoppers' eggs. The same phenomenon is still more apparent in the egg-parasite of the genus *Ootetrastichus*. The complete life cycle of the type of this genus is about 6 weeks, or twice as long as that of the Mymarids. I bred colonies of it from numerous parents for a period of about 8 months, but without ever obtaining a single male specimen. Specimens bred by us in Australia from egg-chambers of leaf-hopper were all females, and many reared from the same, collected by Koebele in Fiji, yielded only this sex. All specimens so far bred from Hawaiian leaf-hoppers, the parasite being now fully established in these islands, are females. It will be observed that these facts are in some respects directly opposed to those observed by Dr. Adler in the case of *Pteromalus*, since he remarks that in general the virgin females gave birth ordinarily to males only. In the Mymarids and in *Ootetrastichus* the virgin females gave birth ordinarily to females only, and in the case of the latter the other sex has not yet been seen by us, in observations extending over a year and a half. I may further remark that in the parasites of Dryinidae, *Cheiloneurus*, *Echthrogonatopus* and others, the number of males falls far short of the females, when extensive rearings are made.

CLASSIFICATION.

The greater number of species described in this paper belong to the family Encyrtidae, and to the very extensive subfamily Encyrtinae. Australia is remarkably rich in Encyrtids, though comparatively few species have been described thence. In the classification of his tribe Encyrtina, Thomson, whose keen appreciation of minute structural characters is familiar to all who have used his works, employed the structure of the mandibles for the further division of this tribe. Ashmead in his recent classification of the Encyrtinae follows Thomson, separating the genera into tribes, based mainly on these same mandibular differences. So far as the Australian species are concerned I have not been so fortunate as to be able to appreciate these structures at the value assigned to them by the Swedish and American hymenopterists, and I have had considerable doubt as to whether the minute distinctions given are really applicable to

the Australian forms. The difficulties that I have encountered may be realized by any one who will examine the figures of mandibles given by me and my descriptions of other structural characters in the genera here described, and then compare them with the characters given in Ashmead's tables of tribes. Such forms as *Meniscocephalus* and *Fulgoriidcida*, which have no trace of a third mandibular tooth and would therefore fall in the tribe called Ectromini, have short stout mandibles, shorter and stouter than in many tridentate species, and do not agree in other characters with the Ectromini. Again such genera as *Echthrodryinus*, *Echthrobaccha*, and *Ectopiognatha* are difficult to place, the apex of the mandibles being very different from the ordinary tridentate form, and probably cannot be considered as having more than two real teeth. The difficulty of seeing clearly the mandibular structure is, as Ashmead observes, considerable, and no proper examination can be made in many species, without either opening the jaws, or dissecting them off. In all the species here described except one, in which the mandibles were opened, I have dissected off these appendages (generally from several individuals of each genus) and examined them in various positions as dry objects, as well as mounted in glycerine and balsam. In *Echthrogonatopus*, *Helegonatopus*, *Chalcerinys* and *Chiloneurus* they are nearly alike, and it was not necessary to figure all these. All the figures were drawn under the high magnification of about 240, excluding those of one or two of the large species. The palpi furnish excellent characters in some cases, but I have not been able to examine them in all the genera. The posterior tibiae in *Neocladia* have two distinct calcaria, the shorter being easily visible with a lens. With the possible exception of this genus, I believe all the other Encyrtinae here described should be placed in Ashmead's tribe Mirini, though, as stated, some have only two mandibular teeth, others two more or less distinct ones and rudiments of one or even two internal to these. Cameron has noted a rudimentary second calcar on the posterior tibiae of one of the Mirini, and I have observed a very short one in one or two Australian species, but not I think in any of those described in this paper.

The other parasites present no difficulty as to the place they should occupy. The genus *Ootetrastichus* comes in the tribe Tetrastichini, amongst the genera that have no mesonotal grooved line, but appears to be very distinct from any of these.

SPECIES AND GENERA HERE DESCRIBED OR NAMED.

ENCYRTIDAE.
ENCYRTINAE.
Meniscocephalus gen. nov.
M. eximius sp. nov.
Fulgoridicida gen. nov.
F. dichroma sp. nov.
Neocladia gen. nov.
N. howardi sp. nov.
Echthrobaccha gen. nov.
E. injuriosa sp. nov.
Echthrodryinus gen nov.
E. destructor sp. nov.
Ectopiognatha gen. nov.
E. minor sp. nov. et typ. gen.
E. major sp. nov.
Echthrogonatopus gen nov.
E. pachycephalus sp. nov.
Helegonatopus gen nov.
H. pseudophanes sp. nov.
Chalcerinys gen nov.
C. eximia sp. nov.
Saronotum gen nov.
S. australiae sp. nov. et typ. gen
S. americanum sp. nov.
Cheiloneurus West.
C. szecsyi Ashm.
C. gonatopodis sp. nov.
C. chlorodryini sp. nov.
EUPELMINAE.
Anastatus Motsch.
A. pipunculi sp. nov.
EULOPHIDAE.
TETRASTICHINAE.
Ootetrastichus gen nov.
O. flavescens sp. nov.
APHELININAE.
Paraphelinus gen. nov.
P. xiphidii sp. nov.
TRICHOGRAMMIDAE.
Pterygogramma gen. nov.
P. acuminata sp. nov.

DESCRIPTION OF GENERA AND SPECIES.

Meniscocephalus gen. nov.

Robust; the head menisciform, the eyes widely separated in front, the ocelli in a triangle with extremely wide base, the posterior ones close to or touching the eye-margins, the sculpture consisting of very large deep punctures. Mandibles short, wide, and with two teeth at the apex. Antennae in the female short and stout, inserted far below the middle of the face, the funiclar joints short, and becoming wider towards the club, clothed with short bristly-black hairs; in the male the six funiclar joints are subelongate and equal, each constricted in the middle, and bearing above and below the constriction a whorl of long hairs, the pedicel being much shorter than one of these joints; the club on the other hand is one and a half times as long. In the male sex they are inserted much nearer the middle of the face. The mesonotum is about as long as the scutellum and bears appressed white setae; the axillae meet inwardly in the female but not in the male, the propodeum is clothed with conspicuous silvery hairs. Wings without a pattern in either sex, the marginal vein very short (rather longer in the male) the stigmal moderate, the post marginal not (or hardly) developed. Abdomen short and wide, depressed above, subtriangular, the ovipositor slightly exserted, the male genital armature almost entirely so.

For structural characters see Plate XVIII, fig. 7-9.

Meniscocephalus eximius sp. nov.

Head dark blue, the great punctures metallic green, the antennae yellowish, more or less sordid, largely owing to the dense clothing of setae, the club paler than the rest. In the male the antennae, except the scape, are entirely infuscate. Mesonotum dark purplish, opaque, or subopaque, punctured like the head, but not so deeply and coarsely; the scutellum very dull, the axillae touching inwardly in the female, well separated in the male, mesopleura blue, opaque. All the tarsi and the tips of the middle tibiae pale, white or yellowish. Abdomen shining blue across the base. Length about 2 mm.

HAB: Bundaberg, Queensland. An internal parasite of a Jassid.

Fulgoridicida gen. nov.

Head very wide, the hairy eyes extremely large, so that the part between them is very narrow, not more than one-third as wide as one of these; the ocelli are in the form of an isosceles triangle, considerably less wide at the base than high, and the posterior ones are close to the eye-margins. The surface of the front is dull, with excessively minute, dense sculpture. Antennae slender, with simple scape, pedicel longer than the first funicle joint, the funicle itself with six, mostly elongate, joints, the club as long or longer than the three last of these. Mandibles distinctly bidentate at apex, the palpi not examined. Thorax dull, with excessively dense minute sculpture, the axillae touching inwardly. Wings without pattern, hairy, and with very short fringe, a more or less distinct, very narrow, transverse, oblique line extending back from near the marginal vein, the latter very short, the stigmal moderately long, the post marginal not much developed. Abdomen subtriangular, wide, depressed, foveated on each side towards base, the fovea bearing short bristles; the ovipositor shortly exserted.

Male differs by the much more widely separated eyes, the space between these being about equal to the width of one of them; by the elongate funicle joints, mostly twice as long as wide, bearing conspicuous, shortish hairs, the pedicel much shorter than the first funicle joint, the club about equal to the two preceding. The head itself is much more decidedly meniscoform, the ocelli are placed in the position of the angles of an almost equilateral triangle. Plate XX, fig. 3.

Fulgoridicida dichroma sp. nov.

Head dull black, scape of the antennae yellowish, or brownish yellow, the rest sordid. Thorax opaque, black with slight greenish or bluish tinge, tip of scutellum more brightly blue or green in some aspects; mesepisternum more or less brownish or piceous; legs yellow, the anterior femora more or less brown or dark. Abdomen of male very short and wide, blackish; that of the female yellow or brownish, dark apically and along the sides to near the base. Antennae of male sordid yellowish, the elongate funicle joints subequal, the pedicel much shorter than the first of these, and apparently darker than the other joints. Length 1¼ mm.

HAB: Cairns Queensland; bred from eggs of a species of *Platybrachys* or allied genus.

Neocladia gen. nov.

Head transverse, menisciform, inflexed, bearing coarse shallow punctures, the space between the eyes wide, the ocelli in a triangle much widest at base, the posterior ones being rather near to the eye-margins, only about half as far from these as from the anterior ocellus. Maxillary palpi long, 4-jointed, the first and third sub-equal, the second much longer than either of these, the fourth curved and very elongate, much longer than the second, and clothed with long hairs. Mandibles broad and apparently simply pointed in one aspect, but in others seem to have three microscopic teeth at apex. Antennae in front view of head inserted well below the middle; those of the female simple, the scape long and slender, the pedicel rather shorter than the first of the six funicle joints, which when seen at their widest, gradually decrease in length and increase in width to the sixth, which is transverse, the club oval rather longer than the two preceding joints; the scrobes short and rather indefinite. Pronotum widely rounded in front; mesonotum about as long as the axillae (which meet inwardly) and the scutellum, the latter much deflexed apically. Wings with a pattern in the female (but uniformly clear in the male) the stigmal vein long, the marginal very short, the post marginal longish in the female, and rather longer still in the male. Middle tibiae armed at the apex with denticles as also are the inner margins of the tarsi; posterior femora on the lower side, the posterior tibiae and basal joint of tarsi on the upper side foliaceously dilated, the tibiae with two distinct spurs. Abdomen small and generally distorted after drying, the ovipositor when exserted short and recurved like that of a *Pipunculus fly*. The male differs chiefly in its clear wings, much less dilated hind legs and the six long branches of the antennae, which are inserted higher up on the head.

Plate XVIII, fig. 1-6 and fig. 10.

Neocladia howardi sp. nov.

Black with various metallic reflections, the antennae with the scape ferruginous, the rest more or less obscure, becoming black or dark fuscous towards the tip, as are the branches in the male. Front and middle legs more or less yellowish-brown in the female, the middle tibiae darker, the base of their tarsi being pale, the tips blackish. Posterior legs dark, the apex of the femora white. In the male the legs are darker, but both sexes vary

in this respect. Wings in the female with the apical half fuscous, paler near the tip, and containing two white spots, opposite one another, the upper placed just beyond the stigmal vein, while there is a narrow transverse fuscous band before the middle of the wing, and a more or less evident longitudinal one, extending from near the base along the lower margin of the wing. Head dull, green or purplish, and with large shallow punctures, the lower parts of the face often more shining, the mouth-parts pale. Thorax somewhat shining, distinctly but not brightly metallic, clothed with short black hairs, with indefinite surface sculpture, and excessively fine puncturation; scutellum above very dull, densely sculptured, the decurved apex smooth and shining. Abdomen black, purplish at base. Length 2-5 mm.

HAB: Bundaberg, Queensland; an internal parasite of a common Jassid. Named for Dr. L. O. Howard, who, some time since, published a very lucid paper on the Encyrtines with branched antennae, and a most interesting account of the biology of the Chalcididae. Koebele's number for this species is 2322.

Echthrodryinus gen. nov.

Head much wider than the anterior part of mesonotum, its outline subsemicircular ,the space between the great eyes very narrow, not more (where narrowest) than half as wide as one of these; the posterior ocelli close to the eye-margins, and much more remote from the anterior one than from one another, the face inflexed. Eyes clothed with very short pale hairs. Mandibles with two small, but distinct, and more or less acute teeth, and an inner apical truncation with its angle sub-rectangular, but not forming a distinct tooth. Antennae inserted near the mouth, the scrobes elongate and convergent above, the scape simple, the six funicle joints short, and not differing much in length, but the apical ones wider than the basal; the club with three subequal joints, and as long as the three or four preceding joints of the funicle; the pedicel elongate, as long, or longer than, the two first joints of the funicle, but not much thickened. Maxillary palpi short, the second and third joint extremely short, the fourth distinctly longer than either of these. Face between the anterior ocellus and the great facial impression nearly smooth, but with some sparse and very faint punctures. Mesonotum finely punctured and somewhat shining, the scutellum excessively densely sculptured except at apex, the axillae meeting inwardly. Wings with a very short marginal fringe,

the marginal vein very short, the stigmal longish and clavate, the post-marginal indistinct and little developed. An oblique, hairless, transverse line, narrow above, extending from or near the marginal vein, is easily seen. Abdomen short, triangular, about as long as the thorax, concave above, the ovipositor very slightly exserted, the hypopygium not prominent. The general appearance of this genus is rather similar to that of *Parencyrtus* Ashm.

Male differs greatly from the female in the comparatively small and widely separated eyes, the ocelli in an almost equilateral triangle, and the very dense surface sculpture of the head, and the more hairy antennae, with small club-joint; the mesonotum, scutellum and head are similarly dull and densely sculptured.

Plate XIX, fig. 4.

Echthrodryinus destructor sp. nov.

Head black, the mesonotum blue, metallic, in some aspects shining, very finely punctured, and clothed with short black hairs; scutellum dull at base and with very dense microscopic sculpture, its apex in some aspects shining and brilliantly green or blue, and with some longish dark hairs; thorax beneath, and pleura black, not or hardly metallic; abdomen brightly metallic green on the basal portion. Wings hyaline, without markings, uniformly hairy, except at base, neuration obscure brownish, or brownish yellow. Antennae sordid-yellowish, clothed with short hairs. The whole of all the legs pale, yellowish. Length 1 mm.

HAB: Queensland, widely distributed; parasitic on larvae of *Neodryinus*, *Paradryinus* etc. Koebele's number 2232, under which are also placed specimens of the genus *Echthrogonatopus* and *Chalcerinys*.

Echthrobaccha gen. nov.

In general appearance very like the preceding genus, but the head is perhaps rather more menisciform; the front between the eye-margins is much wider, the width, in a front view of the head, through or near the anterior ocellus is about equal to the width of one of the eyes. The system of large punctures on the head is much more distinct and the punctures larger, though not dense, and becoming sparser towards the facial impression. The

maxillary palpi are longer, the terminal joint much more elongate. The ocelli are more nearly in the position of the angles of an equilateral triangle, the posterior ones being well-separated from one another, but not much distant from the eye-margins. In the wings the marginal vein is rather longer. The mandibles do not differ much from those of *Echthrodryinus*, nor can the antennae be considered to present generic distinctions.

Plate XIX, fig. 2.

Echthrobaccha injuriosa sp nov.

Head black, faintly metallic, with evident large, but shallow, punctures scattered over the front, and most numerous about the ocelli; funicle joints of antennae increasing slightly and gradually in width from the second to the sixth. Mesonotum quite shining in some aspects, finely but distinctly punctured, and clothed with short dark hairs, its colour black with greenish metallic tint. Scutellum dark at base, and finely punctured; it is clothed with short hairs, and in addition bears a few erect, long ones, the apical portion is in certain aspects shining and brilliant metallic green in colour. Mesopleura black with purplish lustre. Wings hyaline and for the most part uniformly clothed with very short dark hairs; a wedge-shaped, transversely-oblique, hairless line does not reach the marginal vein. Abdomen triangular, with purplish metallic lustre. Antennae sordidly yellowish, the club generally entirely dark. All the tibiae and tarsi yellow, the front and hind femora generally largely black or dark. Length 1.25 mm.

HAB: Cairns, Queensland; parasitic on *Baccha*.

Ectopiognatha, gen. nov.

Head moderate, lower part of face much inflexed, frontal space between the eyes moderately wide, probably about as wide as one of these organs, the collapsed state of which renders exact measurements uncertain. Short pale hairs are present on the eyes, but are difficult to see owing to the condition of these being as above stated. The front has a dense microscopic sculpture and more or less evident traces of faint sparse punctures. Ocelli apparently in a subequilateral triangle, the posterior near to, but not touching, the eye-margins. Mandibles broad, with two distinct but minute teeth, and two inner angulations (or still more minute teeth?), the maxillary palpi very

short, four-jointed. Antennae with dilated scape, elongate pedicel, 6-jointed funicle, and elongate, ovate club, as long as the three or four preceding joints; second and third funicle joints small and short. Mesonotum with excessively fine surface sculpture and very feeble scattered punctures, which bear distinct hairs, the axillae not touching inwardly. Wings with short marginal fringe, without markings, evenly hairy, except on a basal portion, where the hairs are sparse, an oblique bare line running from the marginal vein being perceptible. Marginal vein very short, stigmal moderate, post-marginal little developed.

Abdomen short, subtriangular, depressed above, and on each side towards the base with a fovea, which bears very long setae, often so closely appressed as to be only visible on careful examination. Ovipositor not, or scarcely, exserted.

Plate XIX, fig. 6.

Ectopiognatha minor, sp. nov.

Head metallic green, the dilated scape of antennae black, the rest pale yellowish, except the apical half of club, which is dark; the mesonotum brilliantly metallic green or brassy, pilose, shining, the scutellum usually darker, more coppery; the mesopleura shining purplish; legs almost entirely whitish, or tinged with yellow. Abdomen yellowish, bordered with dark. Length .75 mm.

HAB: Cairns, Townsville, and elsewhere in Queensland; bred from eggs of *Siphanta*. Koebele's number 2251.

Ectopiognatha major, sp. nov.

Head in front coppery, more brassy above, dull, with dense minute sculpture, the scape of the antennae black, the rest pale, the apical part of club subinfuscate. Mesonotum slightly shining in some aspects, very faintly sculptured, blue-black; scutellum dull, hardly metallic, except at tip, where in some views it is shining coppery. Legs pale, whitish. Abdomen yellowish, with a dark border. Length .75 mm.

HAB: Cairns; Queensland; a single example bred from the same batch of eggs that produced the pair of *Fulgoridicida dichroma*.

Echthrogonatopus gen. nov.

Head shaped much as in *Echthrodryinus*, the face inflexed, the eyes large, the space, where least, between them, much less than the width of one of these; face between the eyes with very minute surface sculpture, the lateral ocelli near the eye margins, the eyes themselves sparsely hairy, the hairs not very easily seen. Antennae inserted far below the middle of face, scrobes elongate, scape simple, elongate, and funicle six-jointed, the funicle joints wide and short, the club large and about as long as the funicle, the pedicel about as long as the three basal funiclar joints. Mandibles distinctly tridentate, the maxillary palpi moderately long, 4-jointed, the apical joint the longest, the labial palpi with three short joints, which together are about half as long as the maxillary. Mesonotum with short white decumbent hairs or setae; the axillae touching, or nearly touching, inwardly. The scutellum has a very dense sculpture and is extremely dull for the most part, and contrasts strongly with the metallic and finely punctured mesonotum. The wings have an obliquely transverse, hairless line (sometimes incomplete or interrupted) extending from the stigmal vein, which is short and clavate, the post marginal vein also very short, the marginal always longer than the stigmal, sometimes two or three times as long, marginal fringe short.

Male differs in its much smaller eyes so that the front between these is consequently wide, wider than one of the eyes. The face is metallic like the mesonotum, the antennae are much more elongate than those of the female, the pedicel subequal to the first of the six funicle joints, all of which are elongate; the club subequal to the two preceding.

This genus is here made to include two species, which, however, according to the views of Foerster and Ashmead would be generically separated, owing to the difference in the shape of the head, the length of the marginal vein and the position of the ocelli.

Plate XX, fig. 1 and 2.

Echthrogonatopus exitiosus, sp. nov.

Female: head with greenish or other metallic lustre, the front microscopically sculptured, rougher about the ocelli, and with traces of larger, shallow punctures. Antennae black, the club wide, flattened, subequal to the funicle. Mesonotum somewhat

shining-aeneous in some aspects, finely punctate and bearing depressed white hairs; the scutellum black, dull, but with the extreme apex conspicuously metallic in some views; mesopleura purplish-black. Abdomen shining, brassy, coppery or purplish metallic on the basal part, black apically; the legs pale, yellowish.

Male in addition to the generic characters differs from the female in the pale colour of the scape, the other antennal joints being more or less sordid and bearing long hairs directed apically. Length $\frac{3}{4}$ mm.

HAB: Queensland generally; Brisbane, Cairns, Bundaberg; parasitic on *Gonatopus* and allied genera.

Echthrogonatopus pachycephalus, sp. nov.

General appearance quite like the preceding, but the head is rather strongly incrassate, the space between the great eyes extremely long and norrow, the ocelli forming an isosceles triangle, twice as high as its basal width, and the marginal vein is shorter and thicker.

Head with very dense and fine microscopic sculpture and with evidence of a few large, but very feeble, punctures in the region of the ocelli, the antennae yellowish or testaceous, not differing much in structure from those of the preceding. Mesonotum aeneous, shining, and with very dense sculpture. Legs pale yellowish. Abdomen shining metallic green at the base, elsewhere purplish black. Length $\frac{2}{3}$ mm. Male not known.

HAB: Ohio, U. S. A.; bred from cocoons of *Gonatopus* or some allied form, collected by Koebele.

Helegonatopus, gen. nov.

In general appearance and structure excessively like *Echthrogonatopus exitiosus*, but the male differs at once by the funicle having only five joints, which are very elongate, the pedicel being much shorter than the first of these; the female by the small club, only about as long as two or three preceding joints; and both sexes by the longer stigmal vein and short marginal, the latter being not or hardly longer than the former.

Plate XX, fig. 4.

Helegonatopus pseudophanes, sp. nov.

Head black, dull, with slight bluish or purplish tint, the front with excessively minute surface sculpture and some faint larger punctures in the region of the ocelli. Antennae for the most part sordid testaceous or fuscous, the funicle joints sub-elongate. Mesonotum brassy or greenish, shining in some aspects, and with the clothing of white hairs as in the preceding species; scutellum much as in *E. exitiosus*, and with the apex very brightly metallic in some aspects; mesopleura deep black or faintly purple-tinged. Legs entirely pale, yellowish. Two basal abdominal segments bright metallic green, the rest black or purplish-black. Length 1 mm.

This description is made from the female, as I have seen only one male, which was not in good condition, but enabled me to make out the antennal character described under the genus.

HAB: Ohio, U. S. A.; bred from cocoons of *Gonatopus* or allied forms, sent by Mr. Koebele.

Chalcerinys, gen. nov.

Plate XIX, fig. 1.

Differs from either of the two preceding genera in the metallic scutellum which is nearly similar in sculpture to the mesonotum, the former not being conspicuously dull and dark compared with the latter; the wings have an exceedingly short marginal vein, a longish stigmal, and the post marginal hardly developed. In the male the antennal structure is quite different from that of either *Echthrogonatopus* or *Helegonatopus*, from the latter in the six-jointed funicle, from the former in the very short pedicel, greatly shorter than the large basal joint of the funicle, and from either by the peculiarly former scape, as figured (Pl. XIX, fig. 5.) The antennae of the female much resemble those of *Helegonatopus* and are utterly different from those of *Echthrogonatopus*. The front between the eyes in the female is wider than in either of these genera, and in the male is very wide, the eyes bing quite small compared with those of the female. The mandibles are tri-dentate, with the inner tooth smaller; the palpi I have not been able to examine. The axillae appear to be slightly separated. The eyes are sparsely hairy.

Plate. XIX, fig. 5.

Chalcerinys eximia, sp. nov.

Metallic green, or in parts brassy-yellowish, the mesopleura and abdomen black, at most slightly metallic, antennae yellowish or testaceous, more or less sordid, legs yellow except tips of tarsi. Head densely and minutely sculptured, and with evident traces of larger, very feeble punctures; posterior ocelli nearer to the eye-margins than to one another. Thorax with very dense, minute sculpture, the mesonotum and scutellum with similar and inconspicuous pale pubescence, the scutellum smoother and more shining apically. Abdomen subtriangular, depressed above. Male like the female, but with the eyes very widely separated and with long antennae, the scape, and first joint of funicle distinctly marked with black, the club slender and elongate, dark, the pedicel small, dark coloured or largely so. Length $\frac{3}{4}$ to 1 mm.

HAB: Sydney, N. S. W., Childers and Bundaberg, Queensland; parasitic on small wingless Dryinidae of the genus *Gonatopus* or its allies.

Saronotum, gen. nov.

Of rather slender and elongate form; head in front view subelongate with the eyes of moderate size and diverging apically, the front with dense microscopic sculpture of the surface and sometimes with very faint punctures in addition. Ocelli in an isosceles triangle, the posterior near to the eye-margins and also nearer to one another than is either to the anterior ocellus. Antennae with simple elongate scape, and gradually clavate to the apex, the pedicel and basal funicle joints much less wide than the apical ones, the club small, the pedicel shorter than the first joint of funicle. Mandibles tridentate. Maxillary palpi with very long apical joint, subequal to the other three joints together. Labial palpi short, the middle joint extremely short. Mesonotum with appressed pubescence, the scutellum with erect tuft of bristles. Wings infuscate on more than the apical half, the submarginal vein much decurved before reaching the marginal, the latter long, the stigmal rather short, the postmarginal little developed. The basal third of the wings is nearly bare and from the marginal vein a very narrow, oblique, bare line runs back into this portion. Hind legs long and slender. Abdomen rather elongate, pointed at the apex, depressed above, the ovipositor not (or hardly perceptibly) exserted. Male not known.

Appears to me to be allied to the species of *Cheiloneurus*, that are parasitic on Dryinids, but the elongate form and the ovate or subelongate head, as viewed from the front, will readily separate it.

Saronotum australiae, sp. nov.

Head dull, submetallic, the face below the antennae and the scape testaceous or ferruginous. Mesonotum somewhat shining, aeneous, clothed with appressed, short, white hairs; scutellum yellow, the parapsides browner; propodeum very smooth and shining, brassy; mesopleura purple, metapleura with white hairs. Legs brownish-yellow or testaceous, the middle and posterior tibiae and the posterior femora dark, blackish or piceous for the most part. Abdomen shining brassy at the base, the rest brown. Wings with a small basal cloud, and one over more than the apical half ,leaving, however, the extreme tip and two minute obscure spots (one at the tip of the marginal vein, the other nearly opposite this) more or less whitish. Length $1\frac{3}{4}$ mm.

HAB: Bundaberg, Queensland; parasitic on *Pseudogonatopus*.

Saronotum americanum, sp. nov.

Extremely like the preceeding, but distinguished at once by the dark parapsides and anterior part of the scutellum. Head piceous black and very faintly metallic, face above the antennae with the shallow punctures quite noticeable, and more numerous than in the preceding; scape of antennae and face below the antennae brownish. Mesonotum somewhat shining in some aspects, but the surface generally appearing dull from the dense clothing of white hairs; scutellum ferruginous, dark along the anterior margin, as also are the parapsides; mesopleura, propodeum, legs and wings as in *S. australiae*.

HAB: Ohio, U. S. A.; probably rare as only one example was bred from the many Dryinid cocoons sent by Koebele.

Cheiloneurus Westwood.

Cheiloneurus szczcyi Ashmead.

Cheiloneurus szczcyi Ashmead, Ent. News. Philad. XIV, p. 193.

HAB: North America; a very common parasite of *Dryinus ormenidis*, Ashm. Hundreds if not thousands of specimens emerged from the cocoons of that species, collected by Mr. Koebele in Ohio and elsewhere.

Chiloneurus gonatopodis, sp. nov.

Ferruginous or yellow, the club of the antennae, and usually the basal part of the hind tibiae, blackish or infuscate. Ocelli placed on a submetallic area and forming a triangle with narrow base, but hardly twice as high as wide at the base. Eyes with a very few, short and indistinct hairs. Scape of the antennae very slender, cylindrical. Mesonotum with a basal transverse blue band, which is silvery from the clothing of white setae, that it bears; propodeum at the sides dark. Wings infuscate on more than the basal half, except that the tips and around the margins they are nearly hyaline; a darker transverse mark, bearing long black setae, is placed near the base of the marginal vein. Abdomen dark at the tip and also so marked on each side at the extreme base; behind the latter marks there are on each side of the body some very long black setae. Length 1 mm. (Plate XIV, fig. 3.)

HAB. Queensland, generally distributed; Cairns, Kuranda, Bundaberg, Childers; parasitic on *Pseudogonatopus, Echthrodelphax*, etc. Koebele's number 2264.

Chiloneurus chlorodryini, sp. nov.

Very like *C. gonatopodis* and *C. szczcyi* in general appearance, but may be at once known from the former by the absence of the metallic hind-margin to the mesonotum, which however has the same silvery clothing.

Scape of antennae well rounded on the lower side and distinctly dilated. Eyes in a front view of the head strongly converging anteriorly, so that the space between them is, where least, excessively narrow, not very much wider than an ocellus. The ocelli are placed in the form of an excessively elongate triangle, the anterior one being extraordinarily remote from the posterior. The hairs on the eyes are excessively short, but numerous. The scape of the antennae is yellowish, its lower margin dark; the pedicel and funicle entirely white, the club black. The wings are as in *C. gonatopodis*. Length 1½ mm.

HAB: Kuranda, Queensland; taken out of the cocoons of *Chlorodryinus*.

Anastatus Motsch.

The single species here described agrees very well in most respects with *Anastatus* reared from the eggs of Locustidae. The outer calcar of the posterior tibiae is minute compared with the inner, but nevertheless quite visible without the use of a compound microscope. The eyes are collapsed, and I cannot be sure whether they are bare or hairy, but I believe the former to be the case. We should therefore place this insect, following Ashmead's tables, in the genus *Calosoter* Walk. and far from *Anastatus*, but in these tables there is confusion as regards the condition of the eyes, *Solindenia*, a form with very large, hairy eyes, being placed in the bare-eyed group, and again in those tables there is confusion as to the condition of the axillae. Cameron remarks not only that his genus *Solindenia* has hairy eyes, but also that European *Calosoter* has the same, and that the middle tarsi of the latter are not setose. For the present, therefore, I refer this hyperparasite of leaf-hopper to the common genus *Anastatus*, to which at least it is closely allied.

Plate XX, fig. 5.

Anastatus pipunculi, sp. nov.

Head and face reddish purple, the vertex with short black hairs; the face with white, short, but conspicuous, pubescence; the surface dull, rough with indefinite sculpture. Antennae subclavate, entirely dark, metallic in some aspects. Eyes divergent anteriorly, the ocelli in a triangle much widest at the base, the posterior near the eye-margins. Thorax blackish-purple, the mesonotal ridges, sharp, parallel, the clothing white and conspicuous and, like the sculpture, very similar to that of the face. Wings fuscous, hairy, a hyaline, hairless, narrow, slightly curved, transverse band beneath the marginal vein, and a clear space at the base of the wing. Stigmal vein long, but less so than the postmarginal. Tarsi more or less yellowish-brown, the posterior darker, nearly the whole of the hind legs being blackish as is the greater part of the middle and front tibiae, their femora also being largely dark brown or blackish. Abdomen purplish black, depressed on the basal two-thirds, and with a transverse subbasal white band; the three segments following this subequal in length. Ovipositor hardly exserted. Length 2 mm. when scarcely fully extended.

HAB: Bundaberg, Queensland; parasitic on *Pipunculus cinerascens*.

Ootetrastichus, sp. nov.

Head strongly transverse, fully as wide as, or wider than, the thorax, where this is widest, the ocelli in a slightly curved line (or extremely wide triangle) the posterior being very much more distant from one another than is either from the anterior. Antennae with seven distinct joints and a ring-joint, which under high powers of the microscope appears composite, as if compounded of two or three fused joints; the scape slender and long, the pedicel elongate, the first funicle joint very long, narrowed on its apical part, the two next funicle joints shorter than the first, but elongate; the next joint is shorter and wider and, in some aspects at least, appears to belong to the club, as its apex is closely applied to the base of the apical antennal joint; the latter is without any distinct divisions, and is probably the true club. Mesonotum without a grooved line; the scutellum with four, two dorsal and parallel, each placed just within the setigerous tubercles, the other two lateral. Wings evenly hairy, marginal vein fully as long or rather longer than the submarginal, and three or four times as long as the stigmal, the apical fringe longish and continued round the costa to the marginal vein, and on the opposite margin half-way to the base. Abdomen longer than the head and thorax, depressed above, acuminate, the ovipositor slightly exserted.

Plate XX, fig. 8.

Ootetrastichus beatus, sp. nov.

Pale yellow or greenish yellow with the following parts dark fuscous or black: Two subcontiguous spots on the mesonotum in front, extending on to the pronotum and there connected. One at each posterior hind angle of the pronotum. The anterior angles of the parapsides and of the anteriorly-produced axillae, a line and one or two obscure marks near the tegulae; four microscopic setigerous dots on the scutellum, one pair of which are before the middle, the other pair at the hind margin; propodeum towards the sides, four or five pair of lateral dorsal spots on the abdomen (a pair to a segment), the ovipositor and the tip of the tarsi. In certain lights these dark spots show metallic green reflections. Thorax above with very fine microscopic longitudinal rugulosity; basal abdominal segments with two or three setigerous dots on each side, the apical ones with a complete transverse row. A long sinuate seta on each side of the abdomen near the tip, which is sparely pilose. The markings

are subject to slight variations only. Length variable, generally about 1 mm.

HAB: Queensland generally, also Fiji; on leaf-hoppers' eggs. Koebele's number 2230.

Paraphelinus, gen. nov.

Like *Aphelinus* in most respects, but differs from the rather numerous species known to me in the narrower, more elongate wings, the apex of the stigmal vein being situated just about the middle of their length, and in the generally more slender and elongate body, the abdomen twice or more than twice as long as its greatest width and somewhat acuminate. The ocelli are placed in the form of a very wide triangle, the posterior ones close to the eye margins. The antennae are 6-jointed and dissimilar in the sexes; in the female the club longer than the three preceding funicle joints, the first of these very short, the second also short but longer than wide, the third about twice as long as the preceding and subequal to half the club, the pedicel elongate. Male with elongate pedicel, followed by two extremely short joints, almost like ring-joints, the following (or third funiclar) joint very elongate much more so than in the female, not very much shorter than the elongate club, which is not very different from that of the female.

Plate XX, fig. 6.

Paraphelinus xiphidii, sp. nov.

Yellow, the head more ferruginous, the abdomen at the sides with indefinite dark lateral spots, one on each side of the segments, which are subequal in length; mesothorax with a row of setae on either side of the middle line, parallel to one another; two in a line on each side of the scutellum, wider apart than those on the mesothorax; a few other setae on the thorax exterior to those already mentioned; clear oblique hairless line of front wings very distinct, extreme base of wing also nude, the apical fringe not very short. Described from specimens in balsam. Length 1 mm. or more.

HAB: Hawaiian islands; parasitic in eggs of *Xiphidium varipenne* Swezey.

Pterygogramma, gen. nov.

Head strongly transverse, ocelli in a triangle with very wide base, the posterior ones touching the eye-margins. Antennae apparently six-jointed, counting an extremely short ring-joint, the three terminal joints apparently form a widely dilated but pointed club, the terminal joint in some aspects almost spinose in appearance; pedicel widely ovate, the scape also apparently somewhat dilated. Owing to the thinly laminate character of the joints, the antennae are subject to much distortion. Scutellum rather less long than the mesonotum ;the metanotum pointed posteriorly and produced over the base of abdomen; the latter elongate and acuminate, twice as long as the thorax, and apparently laterally compressed somewhat like some Mymaridae; the ovipositor exserted for a length nearly equal to the hind tarsi. Wings with the lines of hairs rather confused, and about 7 or 8 in number, the apical fringe not very long.

Plate XX, fig. 7.

Pterygogramma acuminata, sp. nov.

Head and mesonotum ferruginous, or brownish, the latter with a pair of fuscous marks in front; scutellum, and rest of thorax above, pale yellow; abdomen black. Wings more or less fuscous on the basal half, the dark colour tending to form three dark areas. Tarsi and the tibiae more or less pale yellow, the femora for the most part blackish or infuscate, the middle and posterior pair pale at base and apex. Length $\frac{3}{4}$ mm. The specimens were badly preserved and mounted in balsam.

HAB: Bundaberg, Queensland; bred from eggs of Jassid embedded in twigs of Eucalyptus. Koebele's number 2298.

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DESCRIPTION OF PLATES.

Plate XVIII.

1. *Neocladia howardi*, female.
2. Mandible of the same in two aspects.
3. Maxillary palpus.
4. Antenna of male.
5. Hind leg of female and male.
6. Part of middle leg of female.
7. *Meniscocephalus eximius*, wing.
8. Mandible of the same.
9. Antenna of female of the same.
10. Part of neuration of *Neocladia* male, very greatly magnified.

Plate XIX.

1. *Saronotum australiae*, wing, antenna, maxillary and labial palpus, and mandible; all from female specimen.
2. *Echthrobaccha injuriosa*, wing, maxillary palp, mandible and antenna of female.
3. *Cheiloneurus gonatopodis*, antenna, maxillary palp, mandible, and part of neuration of female.
4. *Echthrodryinus destructor*, maxillary palp, mandible, funicle and club of antenna, and part neuration of female; antenna of male.
5. *Chalcedrinys eximia*, wing, antenna, and part neuration of female; whole antenna of male, and scape and pedicel in a different position.
6. *Ectopiognatha minor*, wing, part neuration, mandible, maxillary palpus, and antenna of female.

Plate XX.

1. *Echthrogonatopus exitiosus*, antenna of male and female; wing, part neuration more enlarged, mandible, maxillary and labial palpus of female.
2. *Echthrogonatopus pachycephalus*, antenna, part of neuration, and head of female; the head of *E. exitiosus* figured alongside for comparison.
3. *Fulgoridicida dichroma*, antenna, part neuration, and mandible of female.
4. *Helegonatopus pseudophanes*, antenna of male and female, and part neuration of latter.
5. *Anastatus pipunculi*, antenna, wing and posterior calcaria of female.
6. *Paraphelinus xiphidii*, wing and male and female antenna.
7. *Pterygogramma acuminata*, wing and antenna of female.
8. *Ootetrastichus beatus*, antenna in two positions and wing of female.

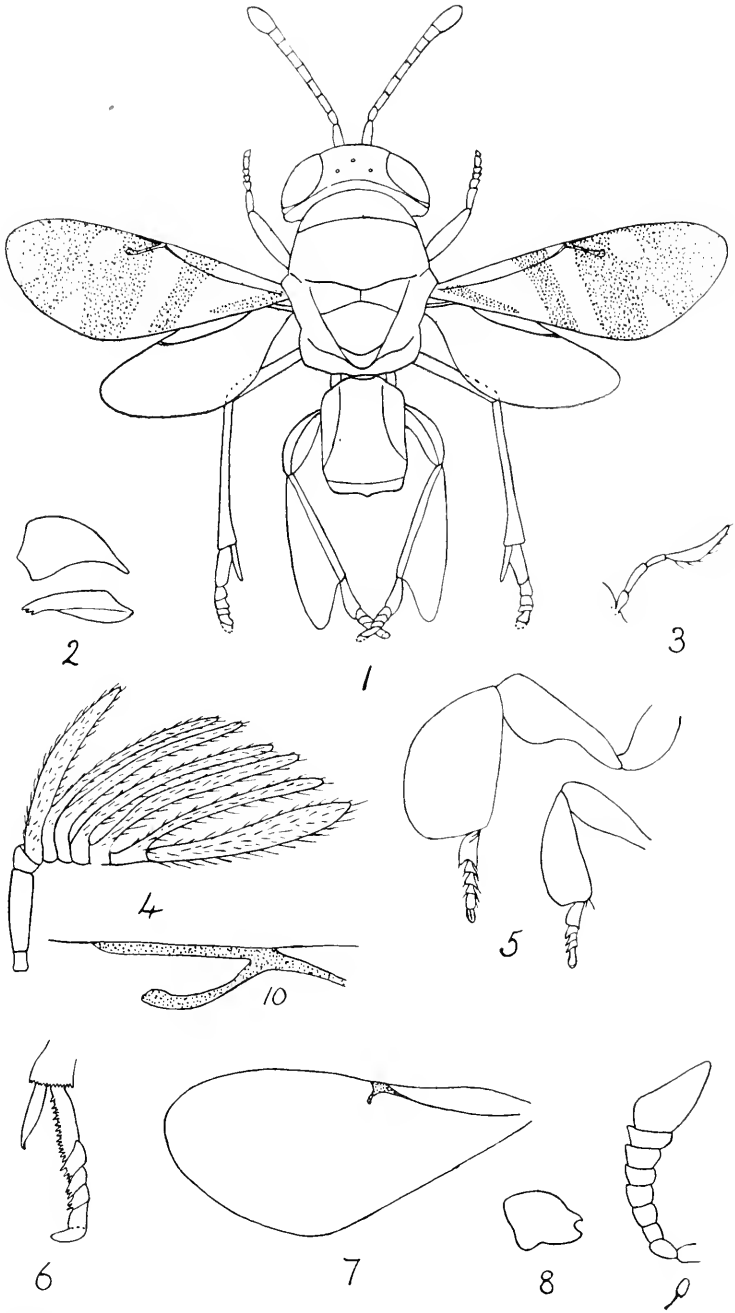

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PLATE XVIII.

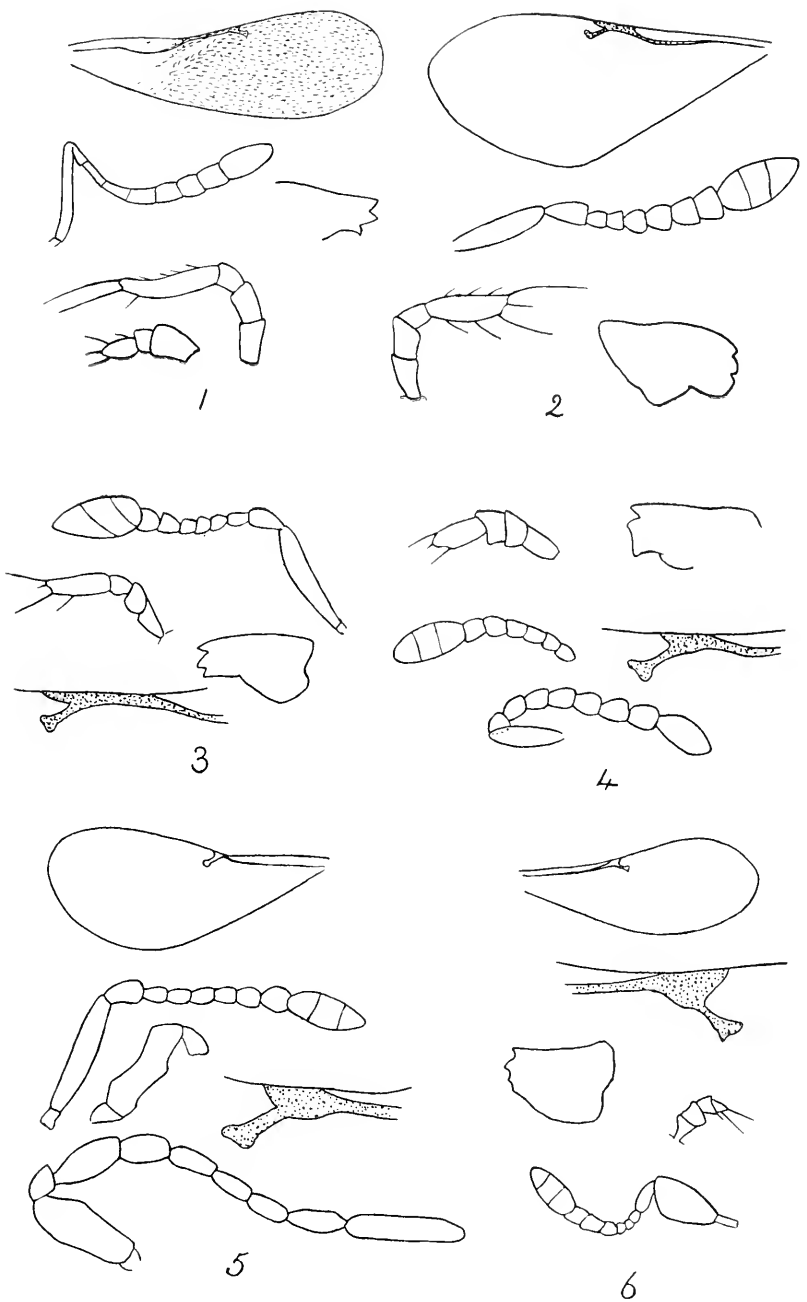

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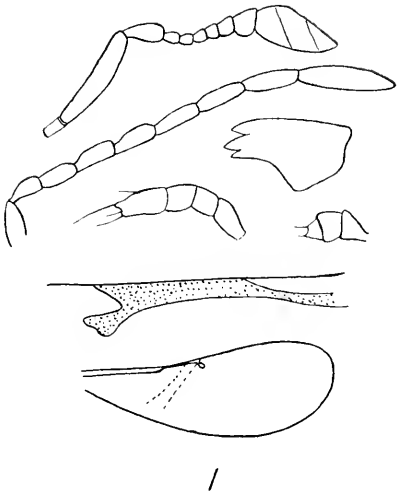
PLATE XIX.



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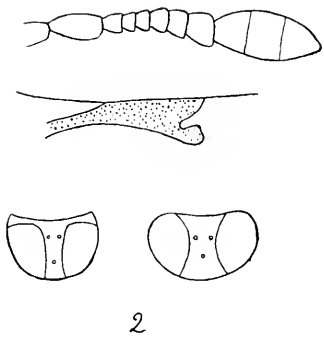

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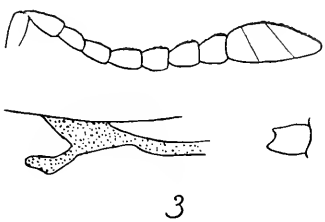

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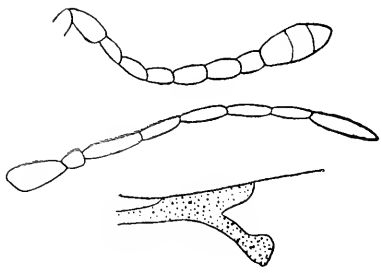

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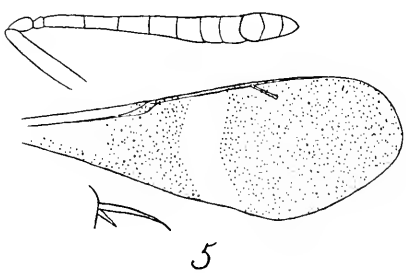

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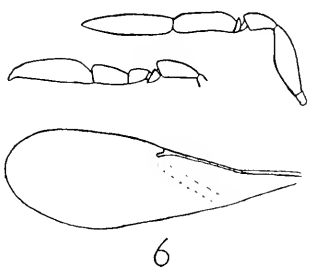

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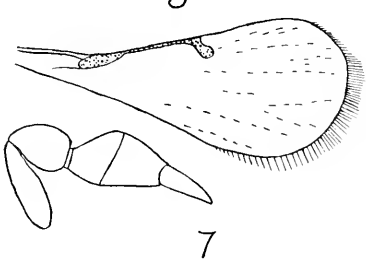

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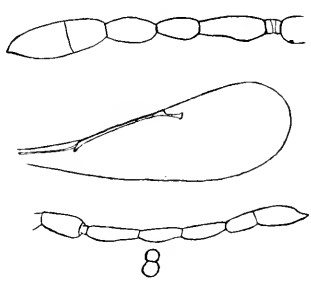

8

Perkins del.

PLATE XX.